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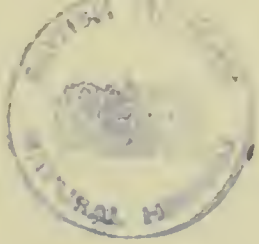

TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

EDITED BY MAJOR A. BUXTON

VOL. XVI.

1944—1948

NORWICH
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1949

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TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

FOR THE YEAR

1944

VOL. XVI PART I.

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NORWICH
PRINTED BY THE SOMAN-WHERRY PRESS LTD., NORWICH.
FEBRUARY, 1945

PRICE 10/-

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SIR H. E. S. UPCHER	1944—45

TRANSACTIONS

OF THE

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FOR THE YEAR

1944

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FEBRUARY, 1945

Norfolk and Norwich Naturalists' Society

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H.M. THE KING

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(to retire 1947)	(to retire 1946)	(to retire 1945)

Ex-officio: MISS G. V. BARNARD

* Note—Mr. Vincent died on November 4th, 1944.

NEW MEMBERS, CHANGES OF ADDRESS, etc.

NOTE.—Instead of reproducing the full list of members, only alterations are given here.

NEW MEMBERS, 1944.

Banham, P. R., 25, Larkman Lane, Norwich.

Buckton, P. R., Wymondham.

Buncombe, G. H., Emergency Hospital, Attleborough.

Camm, Gordon, 71, Gipsy Lane, Norwich.

Collins, W. A. R., 40 William IV Street, London, W.C.2.

Goff, M. G., 299, Aylsham Road, Norwich.

Hawes, P. A., 66, Portland Street, Norwich.

Kirby, P., Midway, Woodland Drive, Thorpe End, Norwich.

Libbey, R. P., Springway, Reffley Lane, Wootton Road, King's Lynn.

Matthew, J. W., The Old Cottage, Upton Grey, Basingstoke.

Morris, G. E., Pike House, Gong Hill, Farnham, Surrey.

Paston-Green, J., Thatched House, Salhouse, Norwich.

Porter, W. E., Pensthorpe Hall, Fakenham, Norfolk.

Rix, A., 4, Intwood Road, Cringleford, Norwich.

Wiltshire, E. P. (life member), c/o, The Grange, Somerton, Norfolk.

CHANGES OF ADDRESS.

Carruthers, Douglas, Elder Farm, Grimston, King's Lynn.

Hewitt, H. Dixon, 29, Newtown, Thetford.

Salisbury, E. J., D.Sc., F.L.S., F.R.S., Director, Royal Botanic Gardens, Kew, Surrey.

Taylor, G. B., 7, Candover Close, Harmondworth, West Drayton, Middlesex.

Wade, Miss O. M., Snowshill Manor, nr. Broadway, Worcestershire.

Waterfield, Mrs., Snape, Saxmundham, Suffolk.

Wormald, H., Humbletoft Cottage, Dereham.

Van Poortvliet, Mrs., The Beeches, Stratton Strawless, Norwich.

MEMBERS LOST BY DEATH IN 1944.

Miss E. J. Barrow, Mr. A. R. Buxton, Mr. John Cator, Mrs. Kerrison. Mr. J. Vincent.

NORFOLK AND NORWICH NATURALISTS SOCIETY, 1943-44.

GENERAL ACCOUNT.

	£ s. d.		£ s. d.	£ s. d.
April 1, 1944				
To Balance	79 0 10	By Transactions Printing	100 16 6	
„ Subscriptions	123 10 0	*Less* Publication Fund	2 1 0	
„ Interest on Investments £300 4% Consols				98 15 6
£105 6s. 10d. War Loan	9 13 8	Library Rent		6 5 0
„ at E.A. Trustee Bank	3 8 8	Assistant Secretary, Honorarium		15 0 0
„ Sales East Anglian Flora 1 15 6		Purchase Transactions		11 1
„ „ Transactions 3 7 6		Printing		2 8 6
	5 3 0	Insurance		13 6
		Postage, etc.		1 7 0
		Balance Barclays Bank, March 31, 1944 ...	2 14 4	
		E.A. Trustee Bank	93 1 3	
				95 15 7
	£220 16 2			£220 16 2

LIFE MEMBERSHIP ACCOUNT.

	£ s. d.		£ s. d.
To Balance April 1, 1943	60 12 2	By Balance E.A. Trustee Bank, March 31, 1944	63 17 4
„ Interest on Investment	1 15 0		
„ Interest E.A. Trustee Bank	1 10 2		
	£63 17 4		£63 17 4

LIBRARY ACCOUNT.

	£ s. d.		£ s. d.
To Balance April 1, 1943	47 10 3	By Purchases	2 12 0
„ Interest E.A. Trustee Bank	1 3 6	Balance E.A. Trustee Bank, March 31, 1944	46 1 9
	£48 13 9		£48 13 9

Audited and found correct.

C. R. A. HAMMOND,
Hon. Auditor.
25*th* April, 1944.

I

HON. SECRETARY'S REPORT.

The 75th Annual Meeting was held at Norwich Castle Museum on April 29th, 1944. The retiring Hon. Treasurer, Mr. F. C. Hinde, presented a satisfactory balance sheet for the year and was accorded the Society's thanks for continuing in office for a further term. The following officers were elected :— Sir Henry Upcher to be President in 1944—45 and Mr. Jim Vincent President elect ;* Miss C. E. Gay to be Hon. Treasurer ; Messrs. G. J. Cooke, B. B. Riviere and H. Wormald to serve on the committee for three years in the places of members retiring by rotation ; Mr. C. R. A. Hammond was re-elected Hon. Auditor and Mr. H. W. Back Hon. Secretary. Four new members were elected.

Miss C. E. Gay delivered her Presidential Address on " The Work of the Norfolk Naturalists' Trust." In voicing thanks to the retiring president, Sir Henry Upcher stressed the need of full co-operation between this Society and the Trust. He hoped that membership of both would increase, and would provide a medium through which those who lived in rural areas could induce city dwellers to acquire a closer knowledge of what was really happening in wild places, and the country-side generally. Mr. Russell Colman, in proposing that Mr. Jim Vincent should be President-elect, spoke of the great debt owed him by naturalists for his work in protecting rare birds and their eggs during the many years he had looked after Lord Desborough's sanctuary at Hickling. Mr. Vincent, replying, stated that he was convinced that within the next ten years the black-tailed godwit would again be breeding in Norfolk.

It was hoped to carry out a few fungus forays in October, 1944, but war conditions naturally caused difficulties ; one foray took place on October 22nd, at Wheatfen Broad, and was attended by Mr. R. W. G. Dennis, assistant mycologist at the Herbarium of the Royal Botanic Gardens, Kew. The names of 12 new members were brought forward for election at the next meeting.

* Note.—Mr. Vincent died on November 4th, 1944.

II

THE JUNIOR BRANCH OF THE NORFOLK AND NORWICH NATURALISTS' SOCIETY.

Annual Report, 1944.

The Junior Branch is primarily intended for those young people who being at school or college are unable to attend the meetings of the Senior Society, but others interested are eligible.

The Annual Subscription is 2s. 6d.

The present membership numbers 80.

Nine new members joined during the year.

Four members resigned during the year.

Owing to transport difficulties, only one meeting could be held during 1944.

Eighteen members met at Quidenham Hall on April 19th by kind invitation of the Countess of Albemarle. An interesting day was spent round the Mere and in the Hall grounds. A Wood Warbler was heard singing in the Mere Woods and later identified by two members. This is the first time a Wood Warbler has been seen at Quidenham.

BALANCE SHEET for the Year ending 30th September, 1944

Receipts	£	s.	d.	Expenditure	£	s.	d.
Balance from 1933 Account ...	5	14	10	Norfolk Wild Bird Protection Committee	1	1	0
24 Members' Subscriptions ...	3	0	0	Postages		9	6
				Balance in haed	7	4	4
	£8	14	10		£8	14	10

III

PRESIDENT'S ADDRESS

THE NORFOLK NATURALISTS TRUST

Presidential Address, delivered by Miss C. E. Gay to the members of the Norfolk and Norwich Naturalists' Society, at Castle Museum, Norwich, on April 29th, 1944

Much has been heard recently of post-war planning schemes, and the inclusion of special areas to be scheduled against development and of nature reserves within these, has raised the hopes of naturalists throughout the country.

Norfolk has sent in suggestions to meet its own needs—drawn up by a committee of specialists appointed for the purpose ; and if these recommendations find favour, the natural features for which the county is so well known and its unique fauna and flora will be safeguarded for posterity.

In possessing a Trust which was formed for such purposes the county is well-equipped for looking after such reserves, and in the following record I have related the circumstances which led to the inception of the Norfolk Naturalists Trust, and to those which followed its foundation, in the order in which they occurred. Such an account would be impossible without reference to the founder, Dr. Sydney Long, and to his personal part in the events as they happened, but it is obviously not within the scope of this address to give more than the briefest outline of his work for the Trust for which naturalists throughout the country are so much indebted.

The similarity between the titles of the Norfolk and Norwich Naturalists' Society and the Norfolk Naturalists Trust has unfortunately been the cause of some confusion between the two organisations, and I have tried to make clear their different spheres while emphasising the desirability for the close co-operation and sympathy which does indeed exist between them.

In order to bring the record up-to-date it is necessary also to include some description of war-time conditions and of their effects upon the nature reserves of Norfolk, although it is hoped that, in the main, these will prove transitory.

The geographical position of Norfolk and its widely different natural features are responsible for the richness of the fauna and flora for which it has held pride of place in the country since the first known records of natural history. Some of the earliest of these come from Sir Thomas Browne, in whose day the undrained fens and marshes of East Anglia attracted many birds which have since been lost to the country as breeding species. Their disappearance was the result of the great agricultural development of the eighteenth century, but there have been other losses, some of which might have been avoided but for the ruthless pursuit by collectors of skins and eggs. The earliest Act now in force to preserve bird-life is the Wild Birds' Protection Act of 1880. Unfortunately this protection by law of the rarer species of birds, and of those believed to be beneficial to agriculture, is for obvious reasons difficult to enforce in remote places and is frequently evaded.

It may have been the realisation by Norfolk naturalists of the county's earlier losses that induced them to take a definite lead in regard to the protection of its breeding birds, for one of the first societies in the country which existed for this purpose was the Breydon Wild Birds' Protection Society formed in 1888. This was followed some years later by the Blakeney Point Wild Birds' Protection Society and soon after by the Wells and the Wolferton Societies. In each of these special areas one or two people made themselves responsible for the collection of sufficient funds for the employment of a Watcher during the breeding season, and as at that time these places were little known and somewhat difficult of access such protection was all sufficient.

After the war of 1914—18 however, there was a rapid improvement in transport facilities and these, with the advent of the small car, were factors in the ever-increasing popularity of Norfolk as a holiday resort. Hitherto summer visitors were confined mainly to the Broads and the coastal towns, but now every village became accessible, and the beaches and quiet sea-shore, up to this time known to the comparatively few people interested in the bird-life there, were invaded by holiday-makers.

For this and other reasons the supervision and control of these special areas became increasingly difficult and

involved too much responsibility for the one or two persons concerned. Accordingly in 1921 the Norfolk and Norwich Naturalists' Society took over the administration of these local societies and, at Dr. Long's suggestion, formed the Norfolk Wild Birds' Protection Society with him as its Honorary Secretary and Treasurer. He was, as everyone here well knows, one of the most active members of the Society for many years, its President in 1927, Hon. Sec. from 1912—1935, and editor of the Transactions form 1912—1929. During all this time he rarely missed any of the regular monthly meetings, and as Editor he maintained the high standard for which the Transactions of the Society have always been known. His work for this Society and later for the Norfolk Naturalists Trust was the natural outcome of a life spent in the appreciation and enjoyment of his native county. No man has ever had a more intimate knowledge of it—gained from personal observations from boyhood and from wide reading and study of its local history ; or of its bird-life, the study of which was his life-long hobby. Born at Wells it was natural that with so many happy memories of its beaches, marshes and creeks, the North Norfolk coast came first in his affection, and it is not surprising that his association with the nature reserves of the county began in this district.

The first Norfolk reserve to be established as such was Blakeney Point. This was purchased and handed over to the National Trust in 1912, mainly through the agency of Dr. F. W. Oliver, whose name will always be associated with the Point for the valuable scientific work carried on there over a period of many years.

The war of 1914—18 then intervened, and it was eleven years before a similar opportunity arose in regard to Scolt Head Island—at that time only a name to most people, even in Norfolk, but well-known both to Dr. Oliver for its botanical interest, and to Dr. Long from his boyhood. Their co-operation in the work of acquiring the island and of securing it as a nature reserve was therefore most appropriate. An appeal for the necessary funds met with generous response and it is remarkable that within a month Dr. Long had collected £600. At an historic meeting held on the Island in the summer of 1923 it was formally handed over to the National Trust.

The acquisition of Scolt Head and his subsequent responsibility for its administration as Honorary Secretary and Treasurer of the Local Committee of Management led Dr. Long to consider the desirability of safeguarding other parts of Norfolk from the development then beginning so rapidly to spoil certain parts of the coast line and other places. His long drives about the countryside—in an open car in all weathers—had made him familiar with every heath, mere, wood and marsh of ornithological interest ; and it was due to this intimate knowledge of the amenities of the county, and of the developments which threatened them, that the idea originated and gradually took shape in his mind of forming a Norfolk Trust to look after Norfolk sanctuaries—a Trust that would in no way conflict with the comprehensive aims and objects of the National Trust, but one that by reason of its specialised knowledge of the County would be pre-eminently equipped for looking after the interests of the natural history peculiar to Norfolk.

It was not until the year 1926 that the opportunity for which he had been waiting presented itself. In the early spring of that year the Cley marshes—well known to ornithologists for the rare birds of passage often seen there on migration, and much coveted by sportsmen as a duck shoot—was offered for sale. Faced with the probable exploitation of such a property Dr. Long knew that there was no time to lose and, exercising his gift for firing others with his own enthusiasm, within an incredibly short time he had extracted from a few friends and acquaintances the promise of a sufficient sum for the purchase. The suspense of that auction will long be remembered by those who attended it for, as had been foreseen, a bidder for a syndicate of wealthy sportsmen from the south of England, sent the price soaring perilously near the limit of Dr. Long's resources before his opponent gave up the contest. A week later a meeting of the purchasers was held at the George Inn at Cley, at which it was resolved unanimously that the property should be established as a breeding sanctuary to be vested in the hands of and administered by a body of local naturalists as soon as such a Trust could be formed.

It has never been within the province or powers of the Norfolk and Norwich Naturalists' Society to hold and manage

property, the practical study of Natural Science being its primary aim and object, and to have changed completely its constitution, established as it was in 1868, for this purpose would not have been desirable, and would indeed have met with opposition from the majority of its members.

The legal machinery necessary for the forming of a company to hold the Cley marshes was therefore put into operation at once and The Norfolk Naturalists Trust was incorporated on November 5th 1926. It is a company limited by guarantee without a share capital and not for profit. A few of the principal objects for which it was established can best be quoted from the Memorandum of the Trust :—

> " To protect places and objects of natural beauty or of ornithological, botanical, geological, zoological or scientific interest from injury, ill-treatment or destruction.
>
> " To establish, form, own, and maintain sanctuaries or reserves for the preservation of birds or other animals, and to establish, form and maintain reserves for wild plants.
>
> " To promote research in all branches of Nature Study, and to make grants or donations for such purposes. "

A year after its incorporation the Trust was pronounced a charity, in the legal sense of the term, by the Charity Commissioners, and as such is exempt from the payment of Income Tax.

The time and energy which Dr. Long as Honorary Secretary and Treasurer of the newly-formed Trust proceeded to devote to this work can best be judged by the fact that at its first General Meeting, held only four months after its inauguration, there were already thirty-eight Life Members and a bank balance of just upon £1,000. Moreover it continued to grow and prosper.

The first addition, in 1928, was the marsh in the parish of Martham known as Starch Grass. It was purchased as a breeding ground for bitterns, bearded tits and harriers, and although only 26 acres its value is much increased by the fact that it adjoins the Horsey Hall estate with its wealth of bird-life.

In the following year, 1929, a small wood of oak trees believed by Prince Frederick Duleep Singh to be on the site of an ancient forest, and bequeathed by him to the Archæological Trust for

that reason, was handed over by that Society to the Norfolk Naturalists Trust as being a more suitable body to hold it.

In this year also a special fund was raised for the purchase of a permanent dwelling for the Watcher of Scolt Head Island, for although the Island belongs to the National Trust the watcher there has always been maintained by means of the Norfolk Wild Birds' Protection Fund. These premises, now known as Dial House, were formerly the old Victory Inn with its brewhouse and barn. Two rooms are reserved by the Trust for the use of visitors to the Island, and in accordance with one of the objects for which the Trust was formed—that of promoting scientific research—the brewhouse was leased, until the early part of the present war, to Cambridge University for the use of students who have done much valuable scientific work on the Island.

In July 1930 another appeal was made for the purchase of Alderfen Broad. It is so seldom that one of the Broads changes hands that it was felt that the opportunity of acquiring one so suitable as a reserve should not be missed ; moreover Alderfen cannot be approached by water because the stream connecting it with the Broads and river system is not navigable. The water is for the most part shallow—as the abundance of water-lilies in summer shows—but there are deep pools where some of the biggest bream taken in the Broads have been caught. There is good cover for bird-life in the surrounding reed-beds and black-headed gulls nest on the floating " hovers " ; also the fen-flora of the adjoining marshland is of special botanical interest.

In order to raise money for this and for possible future purchases the first of the series of Greetings cards which have proved so popular was produced in the autumn of 1930. The bearded tit, from a painting by Mr. J. C. Harrison, because of its special association with the Norfolk Broads was most appropriately chosen as the subject of this first one, and the modest supply was sold out within a few weeks.

The rapid afforestation of Breckland, begun in 1921 and proceeding regardless of its effect upon the fauna and flora and other amenities of this unique heathland, had for some time been the cause of great concern to those familiar with it, and especially to naturalists. Dr. Long left no stone unturned in

his effort to secure for posterity a sufficiently large area of typical breck in its natural state, and his failure to achieve this object in his life-time was the one great disappointment he experienced in his work for the Trust. He had, however, the satisfaction of obtaining Commoner's rights over Lakenheath Warren by the purchase in 1932 of three cottages in the village of Lakenheath to which such rights are linked. In this way this large tract of heath was saved from afforestation.

Hopes of obtaining a suitable reserve in Breckland were again raised when in 1934 the Culford Estate was sold. An anonymous donor was prepared to meet all the expenses of purchase and transfer of 1200 acres of it—known as the Icklingham Strip— if the Forestry Commissioners, who had bought the whole estate, could be persuaded to part with this area. Negotiations between the various organisations concerned went on for a considerable time, and the disappointment was in consequence all the greater when the Forestry Commissioners eventually decided that this land was needed for a special purpose and could not therefore be resold.

The increasing demand upon his time, made by the rapid growth of the Trust was the chief reason for Dr. Long's request, at this time, that the Norfolk and Norwich Naturalists' Society should appoint another Hon. Sec. to take over the work which he had carried on for more than twenty years. This decision involved the future of the Wild Birds' Protection Society with which he had been associated ever since the small separate societies at Yarmouth, Blakeney, Wells and Wolferton, had been incorporated as one body. It was by mutual agreement therefore that in 1934 the responsibility for its administration was transferred by the Norfolk and Norwich Naturalists' Society to the Norfolk Naturalists Trust.

During the next two years Dr. Long worked untiringly to make the Trust more widely known, and by persuading those interested in it to become Life Members he began to build up the reserve fund so necessary for a progressive policy. One instance of this far-reaching influence was the promise of a substantial legacy from a resident in Cornwall—a bequest which materialised some years later.

The early spring of 1937 saw the completion of the Watchers Cottage at Cley—a compact little house strongly built of red

brick and flints to withstand the exposure of this part of the coast. The site for it had been purchased with the marshes, across which it has an uninterrupted view to the sea.

The high ground known as the Eye at the eastern end of the Salthouse marshes, between them and the sea, with its two bungalows, was purchased in this year through the courtesy of the previous owner, and with the help of a grant from the Pilgrim Trust. It was felt that this precaution was necessary to prevent so desirable a site from being developed commercially, particularly as Great Eye had been used as a tea-house some years previously. An interesting feature of this property in pre-war times was the bird-trap constructed on the top of the Eye for catching and ringing migrating birds.

Another small property which came to the Trust in 1937 was the Duchess's Pightle at Burnham Overy presented by the Duke of Bedford. It adjoins the old windmill and because of its unrivalled view over marshland dunes and sea it had been purchased by the late Duchess—who took especial pleasure in the bird-life of Norfolk—a few years before her tragic death, when flying her own aeroplane.

The following year, 1938, expectation again ran high in regard to a possible Breckland reserve when the Wretham Hall estate with its lovely heaths and meres changed hands. Undaunted by previous rebuffs, and in spite of the illness which soon ended fatally for him, Dr. Long once more petitioned the Forestry Commissioners. The negotiations were long and complicated but eventually, with the assistance of the late Mrs. Rich of Wretham Hall, the Trust secured the two best-known meres, Langmere and Ringmere, with a large enough area of the surrounding breck to form an efficient nature reserve. The Founder of the Trust did not live to see this fulfilment of his efforts, but it is here that it is proposed to raise a memorial to him and there could be no more fitting place for it.

The mere recording of the facts viewed in retrospect tends to dim the achievement of so much in so short a time, for it should be remembered that Dr. Sydney Long's work for the Trust was accomplished in such time as was left over from a busy life as a physician and as an active man in public affairs. His wish that he would one day be able to devote the whole of

his energies to furthering the work which meant so much to him was never realised, but he laid the foundations of the Trust so securely as to pave the way for others to carry it on.

The present war has had the inevitable effect of slowing down the Trust's activities, but during it, besides the Wretham property, another Breckland reserve was acquired in 1942. This lovely little breck of about 300 acres is in the parish of Weeting in the south-west border of the county. It is of sufficient size to form an oasis for the Norfolk, ringed and green plover to continue nesting there when the adjoining afforested land has grown into a conifer forest. It is separated from this on the west by a well-defined stretch of the ancient earthworks known as the Devil's Dyke ; the eastern boundary is a wood of fine beeches, and to the south, between the breck and the river Ouse, is a boggy carr of osiers and reeds where bearded tits have been known to nest and, more recently, Montagu's harriers. It is hoped that this too will be added to the property and so enhance its value as a breeding sanctuary.

In order to bring this record up-to-date it is necessary to review the effects of war-time conditions on the nature reserves of Norfolk and, considered from the aesthetic aspect, these could scarcely be worse. The marshes at Cley are enclosed in the ten-foot high barricade of iron and barbed-wire with its four year's accumulation of rust, which is a feature of so much of the coast-line. Time has somewhat reduced the huge mud-bank resulting from the widening and deepening of the roadside dyke, but it can have no softening effect on the concrete huts of the camp in the north-west corner, nor on the concrete blocks which by their great weight have already caused serious damage to the boundary banks.

The ternery beach at Blakeney Point is littered with shrapnel from aerial target practice, and the greater part of Scolt Head is subjected to almost continuous bombardment from artillery range fire, and from the air. The shell-holes in the dunes and on the marshes will fill up with time, but the destruction of the plantation in the House hills is complete. These maritime, Austrian and Scotch pines were planted fifteen years ago to provide cover and resting places for birds on migration—now they are blackened stumps.

In Breckland tank exercises have churned up the heaths making deep ruts which catch the seeds of noxious weeds such as ragwort, houndstongue, and thistles. Moreover the rabbits —an important factor in the control of breck flora—have disappeared, their burrows being crushed out of existence. The once green tracks at Weeting, and the Drove road by Langmere now resemble wide unmade roads. Part of the Wretham reserve has been taken by the Air Ministry, and also the major part of Lakenheath Warren.

Grim though these conditions appear, no one having regard to the geographical position of Norfolk can question the necessity for the defence precautions taken in 1940, nor dispute the use of such suitable country for the purposes of military training and defence. Time alone will show whether the Trust's reserves have suffered any permanent damage in regard to the purposes for which they were acquired. Such losses of bird-life as have been experienced are mainly due to lack of keepers, for the Watchers for Cley and Blakeney Point are both in the Royal Navy. The question of the control of Nature is a controversial one, but experience of nature reserves has established the fact that some interference is at times necessary, and the killing of vermin is of course an essential part of the watchers' work. At Cley the refuse from the camp attracted so many rats that they were a menace to the duck nesting there until the sea-flood of last April drowned them. Black-headed gulls have also become a nuisance in some places, and at Blakeney Point in 1941 they were responsible for killing most of the tern chicks. These birds will always dominate the area they select for nesting and should be restricted to the gulleries of which there are sufficient in Norfolk

The Sandwich terns at Scolt Head have proved that they do not mind noise as much as human interference, for in spite of the continual racket of gun-fire they have increased in numbers steadily during the three breeding seasons in such conditions. In pre-war days, if too many visitors disturbed them at the beginning of the season, they would peck their eggs and leave, and yet last summer a mis-directed mortar bomb which landed in the middle of the ternery failed to scare away the survivors.

In Breckland there must be considerable loss of ground-nesting birds as a result of tank exercises. It is fortunate that in recent years when so much of their usual habitat has been afforested, both Norfolk and ringed plovers have taken to nesting on arable land, and in the autumn big flocks of " thick knees " preparing for migration are still to be seen on the brecks which remain. The conifer forests in this area are growing higher every year, shutting out the wide sky-line which until a short time ago was so attractive a feature and enclosing such of the open land as remains. The rainfall will probably increase here, and the fauna and flora will change, for few plants, birds or other animals will live in the dark forests. The Norfolk Naturalists Trust has done everything possible to preserve for posterity some of the natural breck-land, and for this it will in future years deserve gratitude.

Finally, though the foundation of the Trust is firm, it needs the co-operation of naturalists throughout the country and particularly of the Norfolk and Norwich Naturalists' Society. Both organisations require the stimulus of youth, and after this war is over, every effort must be made to encourage young naturalists and to interest them in the work which they will have to carry on.

IV

SOME UNUSUAL GROWTHS IN TREES.

By Robert Gurney.

I have recently come across some abnormal structures in trees which, though they have no doubt been recorded before, are sufficiently rare to be worth noting.

(I) In three cases of *Salix cinerea*, two female and one male, I have seen branches on which three flowering shoots sprang from each bud instead of one. Close examination showed that the three shoots did in fact spring from within a single bud-scale, the two side shoots being the products of lateral buds which are normally present but so small as to be sometimes difficult to detect.

Now the single scale of willow buds is generally interpreted as a stipule or a fused pair of stipules ; but this interpretation must be wrong if it covers not one bud but three.

Having had one's attention drawn to these minute dormant lateral buds it is easy to satisfy oneself of their presence in normal shoots, and, by removing the young growing shoots, they can be forced into growth. An example of the natural growth of these side shoots after the death of the central bud is shown in fig. 2. I have a shoot of *S. purpurea* from which the male catkins have fallen, and a pair of shoots is sprouting from each of the catkin scars.

(II) Each flowering shoot of *Salix cinerea* has 4 or 5 basal leaves. In the male catkins between the catkin itself with its series of bracts, each with a flower in its axil, there is an intermediate leaf which is bract-like but longer than the normal bract. This leaf quite commonly has a flower in its axil, but it seems to be usually imperfect. I have seen the same thing in *S. fragilis*, and no doubt the transition of leaf to flower-bearing bract can be quite commonly seen if looked for.

(III) Prof. Weiss* has already recorded the appearance in autumn, upon hazel shoots which have been cut back, of female flowers growing in definite catkins, and approaching the birch

* J. Linn. Soc. 1932. p. 107, and North Western Naturalist, Sept. 1932, p 191

Fig. 1. *Salix cinerea.* Three female Catkins springing from one bud.

,, 2. *S. cinerea.* Two lateral Shoots springing from one bud.

,, 3. Four abnormal female Catkins on one shoot of hazel (enlarged).

Fig. 4. Two normal female Catkins of birch. Usually there is only one on each shoot.

,, 5. Abnormal birch Catkin, the base female and the end male.

,, 6. The male part and end of female part enlarged. Stamens visible in the male part

in the form of the bract. I have nyself found an abnormality even more striking. In this case, in February, a bud had opened to give rise to a flowering shoot bearing four fairly long catkins, just as the male shoot bears 3 or 4 catkins ; but these catkins bore only normal female flowers, and were not pendent like the male ones. In the normal female inflorescence the few female flowers are " telescoped " into a catkin which does not elongate, so that the whole looks like an ordinary bud with a tuft of red stigmas at the end. In this case the red stigmas project all along the catkin—a very remarkable sight.

(IV) On one birch tree in my garden a very large proportion of the female catkins are abnormal. These are erect, and bear female flowers at the base, but male flowers at the end. In those which I have examined the change-over is quite clear-cut without any bisexual flowers, and the difference between the male and female part is obvious, the male part being thicker and tending sometimes to become pendent as it elongates. The flowers themselves seem quite normal. Now, in July, these catkins only differ from normal female ones by being somewhat shorter than usual and having a brown withered end which is all that remains of the male part.

It would seem that this is a case of reversion to a more primitive condition when the catkins normally bore flowers of both sexes, as they do now in sweet chestnut. In the chestnut the inflorescence may bear only male flowers, and in some trees female flowers may be very few or even apparently absent ; but, so far as I have seen, no inflorescence bears only female flowers. Where flowers of separate sexes are borne on one spike it would seem usual for the distal ones to be male, as, for instance, in the reed-mace (*Typha*).

(V) For the normally paired cotyledons on the seedling to develop in threes is an abnormality which seems to be not uncommon. I have seen it very rarely in lime and oak, but in a batch of plane seedlings last year the proportion with three cotyledons was remarkably high. This year I have seen none among my plane seedlings. I have this year found a number of sycamore seedlings with abnormal cotyledons. In one case each cotyledon was partly split into two ; in several one cotyledon was split, generally to the base, giving the appearance

of three complete cotyledons. In all these the first leaves appeared quite normally in pairs. In two cases only did the leaves develop in a whorl of three, and in these plants the cotyledons were quite clearly separate and left three separate scars when they fell. With these two exceptions I have never seen a seedling tree or sapling with leaves in threes ; but it is not very rare to find one branch of an older tree with the leaves so arranged. The same thing is occasionally seen in horse chestnut, and I have once seen it in ash.

Postscript.

I find that tricotyledonary seedlings of sycamore were described by Thiselton-Dyer in 1902 (Ann. Bot. XVI p. 553). His view is summarised as follows :—" I arrive, however, at the conclusion that the simplest explanation is that in all the cases now described, the embryo is provided with three instead of two primordial lateral outgrowths, and that these either develop into three normal cotyledons or that two of them sooner or later coalesce into one which is more or less bifid. If this explanation is true of the cotyledons it must equally apply to the similar phenomena exhibited by the epicotylar leaves." With this explanation I entirely disagree.

V

FEN AND BOG IN WEST NORFOLK

By C. P. Petch, M.B., M.R.C.P.

The War has brought great changes to the English countryside and there is prospect of still more to come. It seems therefore an appropriate time to record the existence and nature of such tracts of wild or semi-wild land as still remain, either as a step to preservation or as a historical note if they should disappear. There are in West Norfolk a number of small areas of fenland and bog which, although less extensive than the Broadland marshes on the eastern side of the county, are of considerable botanical and ecological interest.

Two distinct types of vegetation are included in the title. There is first true fenland, characterised by peat with alkaline soil water, dominated by *Cladium mariscus* and the taller *Carices*, grazed or mown and resembling to some extent the well-known Wicken Fen of Cambridgeshire. Secondly there is bog with (here) shallower peat and acid-loving vegetation dominated by *Erica tetralix, Eriophorum angustifolium, Molinia cærulea, Sphagnum*, or *Narthecium ossifragum*. My excuse for considering them both together is that although typical examples are quite distinct, they merge into one another under the conditions prevailing.

The bogs arise on the lower Greensand for the most part, in valleys or low-lying areas bordering on Callunetum heaths. The presence of the typical flora depends on the obstructed drainage of acid soil water from the adjacent Callunetum. Persistence of this Callunetum is in turn associated with the periodic burning of taller vegetation, such as young birch trees, which might otherwise in this part of the world be expected to colonise it. After such fires certain of the bog species (*Erica tetralix, Molinia, Juncus squarrosus, Scirpus cæspitosus* and *Drosera rotundifolia*) tend to spread temporarily into the Callunetum, thus enlarging their territory. The bog itself is usually too wet to burn, but on Dersingham 'Fen' (a bog, beside which, the railway runs) the peat became so dry

during a hot summer in the 'twenties that over big stretches it burnt down to the underlying sand. Recolonisation by *Eriophorum angustifolium* (cotton grass) has proceeded slowly, but even now there are large patches of bare sand to be seen, bordered by a pure growth of cotton grass. In the unburnt bogs, the wettest areas, where rudimentary drainage channels have been made, develop ' carr '. This word is used locally for a scrubby wood of birch, sallow and bog myrtle, with a permanently wet floor. In the carr are a number of characteristic shade or marsh plants which will not tolerate the acid conditions of the bog, but many of which are found in the fens.

There follows a list of species of plants making up the flora of four typical bogs, viz. :—

1. Roydon Common (by far the most extensive and luxuriant).
2. Dersingham Fen (noted above).
3. A small area of Ling Common.
4. East Winch Common, on Glacial Gravel, with shallower peat and less bog than the others. It is enriched by two species not found commonly in West Norfolk : *Gentiana pneumonanthe*, which local tradition holds to have been an introduction, and *Littorella uniflora*.

Abbreviations used :—

D = dominant O = occasional L = local

A = abundant R = rare LCD = locally co-dominant

F = frequent VR = very rare.

List of plants.	Status in the four bog areas.			
	1	2	3	4
Anagallis tenella	R	—	—	—
Calluna vulgaris	F	R	A	A
Carex echinata	R	R	R	—
C. lepidocarpa	R	—	—	R
C. panicea	F	—	—	—
C. pulicaris	R	—	—	—
C. rostrata	R	LA	—	—
Cirsium anglicum	LF	—	—	F

List of plants.	Status in the four bog areas.			
	1	2	3	4
Cladium mariscus	L	—	—	—
Drosera anglica	O	—	—	—
D. longifolia	O	R	O	R
D. rotundifolia	F	F	F	O
Eleocharis multicaulis ...	O	R	R	—
Erica tetralix	D	F	A	D
Eriophorum angustifolium ...	A	D	R	R
E. vaginatum	R	—	—	—
Genista anglica	O	—	—	R
Gentiana pneumonanthe ...	—	—	—	A
Hammarbya paludosa ...	R	—	—	—
Hypericum elodes	R	—	—	LF
Juncus acutiflorus	LA	R	A	LA
J. bulbosus	O	—	—	—
J. squarrosus	O	—	O	O
J. subnodulosus	O	—	—	—
Littorella uniflora	—	—	—	R
Molinia cærulea	LCD	F	D	A
Myrica gale	LA	O	LA	—
Narthecium ossifragum ...	A	R	O	—
Orchis ericetorum	R	—	—	—
Oxycoccus quadripetalus ...	A	LA	LA	—
Pedcularis palustris	R	—	—	—
P. sylvatica	R	—	—	F
Phragmites communis ...	LA	—	—	—
Pinguicula vulgaris	R	—	—	—
Platanthera bifolia	R	—	—	—
Polygala vulgaris	F	—	F	—
Potamogeton polygonifolius ...	R	—	—	R
Potentilla erecta	F	O	—	A
Rhynchospora alba	LA	R	R	—
Salix repens	O	—	—	F
Schœnus nigricans	LA	—	—	—
Scirpus cæspitosus	F	R	F	F
Sphagnum spp.	LD	F	LA	O
Succisa pratensis	LF	—	—	F
Utricularis intermedia ...	LF	—	—	—
U. minor	LF	—	—	—

Reference to the older records in Nicholson's *Flora of Norfolk* for such a characteristic species as the cranberry (*Oxycoccus quadripetalus*) shows that at one time this type of vegetation must have been more extensive in the county than it is now. Since it is extremely susceptible to improvements in drainage, the reason for its disappearance is not hard to seek. In Cambridgeshire the bog element in the flora which lingered for a long time, is, as far as I know, practically extinct.

Turning now to the fen vegetation, an entirely different aspect is presented. It occurs in conjunction with the streams that drain the district, the Gaywood river, the Nar and the Wissey, and owes its preservation often to the existence of common rights of grazing, etc. It is subjected to cutting and grazing, but not to fires. Where the grazing is light for a period, a scrub of birch, alder and sallow may develop on the hillocks, but this is not continuous enough to earn the name of carr. In the Wissey valley fens, *Rhamnus catharticus* and *Frangula alnus* are both important constituents of the scrub. The dry margins of the fens are coarse pasture with gorse bushes. In practically every sample of fen small areas of *Erica*, *Sphagnum*, *Drosera*, *Oxycoccus* and other typical bog plants can be found; they are usually located on the part most remote from the main drainage channel. Such species as *Eriophorum angustifolium* and *Succisa pratensis* occur both here among the acidophilous plants and among the sedges. *Epipactis palustris* and *Parnassia palustris* appear intermediate in their requirements, occupying a zone between the true fen of the sedges and the acid bog. Each species in fact has its own range of habitat and, judging purely by inspection, it would seem that the reaction of the soil water is the most important factor in determining this range.

In the following list of plants typical of three fens near the Gaywood river it is not possible to give the exact distribution of each species, but those with a limited range are marked (L) and the purely bog species have been omitted.

List of Fen Plants.	Status.
Agrostis stolonifera ...	A
Anagallis tenella	L
Anthoxanthum odoratum...	O
Baldellia ranunculoides ...	L
Briza media	R
Callitriche stagnalis ...	R
Caltha palustris	O
Cardamine pratensis ...	R
Carex diandra	F
C. disticha	O
C. hudsonii	LD
C. lasiocarpa	O
C. lepidocarpa	R
C. nigra	LD
C. ovalis	R
C. panicea	LF
C. rostrata...	O
Chara spp.	F
Cirsium anglicum ...	LF
C. palustre	O
Cladium mariscus ...	LD
Eleocharis palustris ...	F
Epilobium palustre ...	R
E. parviflorum	O
E. tetragonum	F
Epipactis palustris ...	L
Equisetum limosum ...	O
E. palustre	F
Eriophorum angustifolium	O
Eupatorium cannabinum	R
Galium palustre	F
G. uliginosum	LF
Genista anglica	R
Gymnadenia conopsea ...	R
Holcus lanatus	F
Hydrocotyle vulgaris ...	F
Hypericum acutum ...	R
H. elodes	LF
Juncus acutiflorus ...	A
J. conglomeratus ...	O
J. effusus	R

List of Fen Plants	Status
J. lamprocarpus	R
J. subnodulosus	A
Lotus uliginosus	F
Lychnis flos-cuculi ...	O
Lycopus europæus ...	R
Lythrum salicaria ...	O
Mentha aquatica ...	F
Menyanthes trifoliata ...	F
Myosotis palustris ...	R
Oenanthe fistulosa ...	O
Orchis ericetorum ...	R
O. latifolia	R
Osmunda regalis ...	VR
Parnassia palustris ...	LF
Pedicularis palustris ...	O
Phragmites communis ...	O
Pilularia globulifera ...	L
Potamogeton polygonifolius	O
Potentilla erecta	LF
P. palustris	A
Prunella vulgaris ...	O
Ranunculus flammula ...	F
R. lingua	O
R. repens	R
Rumex acetosa	O
R. conglomeratus	O
Salix repens	O
Samolus valerandi ...	R
Schœnus nigricans ...	LF
Scirpus fluitans	LF
S. pauciflorus	R
S. setaceus	R
Sium erectum	O
Sphagnum spp.	O
Succisa pratensis ...	O
Trifolium pratense ...	R
Triglochin palustre ...	R
Utricularia intermedia ...	LA
U. minor	LA
U. vulgaris	LA
Valeriana dioica	O

Similar fens occur at Marham and East Walton in the Nar valley, and extensively in the Wissey valley.

It is clear that the types of vegetation can only be called semi-natural and will only retain their present form while they are subjected to the same kind of limited human interference as they receive to-day. They would, on the other hand, be rapidly and radically altered by comparatively simple drainage operations, and the control of such operations would be a matter of interest to all Norfolk naturalists.

VI

ROYDON COMMON, WEST NORFOLK

By Eric L. Swann.

Now that this large area of 670 acres has been recommended for preservation by the Nature Reserves Investigation Committee it would be as well to draw the attention of members to this extremely interesting station from a botanist's point of view.

It is situate about 4½ miles north-east of King's Lynn and on the southward side of the main King's Lynn—Grimston road. The Midland & Gt. Northern railway line marks its eastern boundary and a track running from Warren Farm in an easterly direction clearly divides it from Grimston Warren. Geologically, it is on the sands and gravel associated with the Lower Greensand interbedded here and there with the Chalky Boulder Clay. This large tract of land rises somewhat abruptly on its western edge to a height of 120 feet above sea-level.

The plants recorded by botanists in the past throw an interesting light on the changes in flora wrought by improved drainage and deficient rainfall. For instance, in 1918, W. G. Clarke counted no fewer than 174 spikes of *Hammarbya paludosa* (L.) O. Kuntze (Malaxis paludosa L.). Then again, it was in 1910 that the same botanist found *one* flower of *Utricularia intermedia* Hayne. The significance of this solitary find is important in botanical history because Roydon Common is the second British locality from which the extremely shy flowering of this particular Bladderwort has been recorded. Prolonged search this year failed to locate *one* spike of the first-mentioned Bog Orchis and although there was a fair amount of vegetative growth of the Utricularia, not a flower was seen.

Ecologically, the different types of vegetation may be classified as (i) Dry heath ; (ii) Wet heath ; (iii) Reed Swamp ; (iv) Carr, and (v) Bog.

Dry Heath.

Over considerable areas *Eupteris aqulina* (L.) Newm. (*Pteridium aquilinum* L.) is the co-dominant with *Calluna vulgaris* L. but in the proximity of the innumerable rabbit-burrows a more varied flora will be observed. Immediately around the burrows there are large patches of bare ground due to rabbits' scratchings and fringing these are zones of closely eaten turf. These bare areas are colonised by plants which, in the absence of severe winters, are rabbit-resistant. In many cases they are weeds of adjacent arable land and here they colonise the ground denuded by these animals ; this, coupled with the selective grazing, accounts for the unusual floral wealth.

The list of species for these "rabbit-controlled" areas follows—(d = dominant, a = abundant, la = locally abundant, f = frequent, o = occasional, r = rare).

Arenaria serpyllifolia	...	f	*Myosotis arvensis*	...	f
Cerastium vulgatum	...	o	*Nepeta hederacea*	...	o
Cirsium arvense	...	f	*Senecio jacobæa*	...	a
Cirsium lanceolatum	...	o	*Teucrium Scorodonia*	...	f
Cynoglossum officinale	...	f	*Verbascum Thapsus*	...	o

On the highest and driest parts of the Common a list of the characteristic species would be :—

Agrostis tenius	...	a	*Eupteris aquilina*	...	co-d
Aira præcox	...	f	*Filago germanica*	...	la
Arenaria serpyllifolia	...	o	*Galium saxatile*	...	f
Calluna vulgaris	...	co-d	*Potentilla erecta*	...	f
Carex arenaria	...	la	*Teucrium Scorodonia*	...	o
Carex pilulifera	...	r	*Ulex europæus*	...	o
Centaurium umbellatum	...	f			

In passing, many plants of *Teesdalia nudicaulis R. Br.* were seen growing in the exposed soil of the burrows this spring.

Wet Heath.

There follows upon the "dry heath" formation zones of transition before the "wet heath" proper is reached.

Plants characteristic of such transitional zones are :—

Agrostis tenuis	...	f	*Luzula multiflora*	..	o
Anthoxanthum odoratum	...	o	*Molinia cærulea*	...	f
Calluna vulgaris	...	a	*Pedicularis sylvatica*	...	o
Erica Tetralix	...	o	*Polygala serpyllifolia*	...	o
Eriophorum angustifolium		f	*Potentilla erecta*	...	f
Eriophorum vaginatum	...	r	*Scirpus cæspitosus*	...	f
Galium saxatile	...	f	*Ulex europæus*	...	f
Juncus squarrosus	...	a			

In the " wet heath " itself the species, with an ever-present water supply, become more numerous and luxuriant :—

Agrostis canina	f	*Genista anglica*	f
Angelica sylvestris ...	o	*Juncus conglomeratus* ...	f
Calamagrostis canescens ...	la	*Juncus effusus*	f
Carex Hornschuchiana ...	r	*Lychnis flos-cuculi* ...	o
Carex lepidocarpa ...	o	*Molinia cærulea*	la
Carex panicea	a	*Myrica gale*	la
Carex pulicaris	f	*Orchis ericetorum*	f
Cirsium palustre	f	*Potamogeton polygonifolius*	f
Erica Tetralix	a	*Potentilla erecta*	a
Eriophorum latifolium ...	vr	*Ranunculus flammula* ...	f
Eupatorium cannabinum	o	*Succisa pratensis*	f
		Valeriana dioica	f

Reed Swamp.

Owing to the improved drainage this area is limited to the wettest part of the Common and the species list is :—

Eleocharis palustris ...	f	*Menyanthes trofoliata* ...	a
Galium palustre	f	*Phragmites communis* ...	d
Iris pseudacorus ...	o	*Ranunculus flammula* ...	f
Juncus articulatus ...	a	*Utricularia vulgaris* ...	f
Juncus effusus	a		
Mentha aquatica	f		

Carr.

Here and there on the permanently wet parts small scrubby patches are found with the characteristic

Betula pubescens	*Phragmites communis*	
Molinia cærulea	*Salix atrocinerea*	
Myrica gale		

On the southern side is a large damp wood which may well represent the climax of the plant succession of the Common. It is a tangle of vegetation in the summer months and relatively undisturbed.

The list of species there is :—

Alnus glutinosa	f	*Mentha aquatica*	a
Betula pubescens ...	a	*Myosotis palustris* ...	f
Caltha palustris	a	*Phragmites communis* ...	o
Carex paniculata ...	a	*Polygonum Hydropiper* ...	f
Carex remota	f	*Quercus robur*	f
Dryopteris thelypteris ...	a	*Ranunculus flammula* ...	f
Eupatorium cannabinum	f	*Salix atrocinerea*	a
Galium palustre	f	*Solanum Dulcamara* ...	f
		Valeriana officinalis ..	o

Bog.

In the more open zones where competition is less severe owing to water-logged acid soil an interesting number of species is to be found such as

Anagallis tenella	o	*Oxycoccus quadripetalus* ...	r
Drosera anglica	r	*Potamogeton polygonifolius*	f
Drosera longifolia ...	o	*Rhynchospora alba* ...	r
Drosera rotundifolia ...	a	*Utricularia* spp.	f
Narthecium ossifragum ...	f	*Sphagna* spp.	la

A Few Rarities.

In the south-west corner near Warren Farm there are a few acres approximating to the well-known "breck" district of Thetford, that is, 'a tract of heathland broken up for cultivation from time to time and then allowed to revert to waste.' This year a few plants of *Medicago minima* Desr. were found in mid-June together with several plants of *Hypochæris glabra* L. Along each side of the track leading from Warren Farm to the Common, many plants of the rare Fescue grass, *Vulpia ambigua* Le Gall were observed. They were so numerous that the reddish colouration of the rachis conspicuously marked the path. Where this leads on to the Common, a few plants of *Apera interrupta* (L.) Beauv., were seen. This grass is native only in a few scattered localities in East Anglia and is nowhere common; indeed, it is given in most floras as decidedly rare. With us it appears to be increasing as I have noted it from several stations in West Norfolk.

Roydon Common is such a large tract of land, with divers types of vegetation, that a complete list of species would entail many months of intensive study, but it is hoped that this paper will prove to members the floral wealth of this corner of West Norfolk.

VII

WILD BIRD PROTECTION IN NORFOLK IN 1944

Report of the Council

The Council of the Norfolk Naturalists Trust has pleasure in presenting to supporters of the Wild Birds' Protection Fund the Annual Report and bird news of the past year. The generous help which continues to be given year by year by so many people has been largely responsible for the continuance of the work of bird protection throughout the five years of the war, and the Council is grateful for their assistance. Now, with the hope of peace in the near future, it is necessary to look forward to post-war conditions when the watchers serving in the Royal Navy will return to Cley and Blakeney, and some supervision will probably be necessary for the reserves which have been acquired during the war at Weeting and Wretham. It is hoped therefore that the Trust's friends will be good enough to make its work known to any one likely to be interested, for more financial help will be needed to meet these added responsibilities.

Bird protection in Norfolk has lost an ardent supporter in Mr. Jim Vincent who died on November 3rd of this year. He was, as one would expect of the head keeper of Hickling, a keen sportsman and an excellent shot, but at heart he was more concerned with the protection of birds in his district than with shooting them. Of recent years he had cherished the hope of being able to keep the Broad as quiet during the winter months as in the breeding season, in order to see the effect upon the duck population, and it was a disappointment to him that he was not able to carry out such a plan. His progressive policy of cutting, grazing and flooding in order to make the Broad attractive to duck and waders proved so successful that it has become famous as a breeding sanctuary throughout the country. He was always ready to give pleasure to those visitors to Hickling who wished to see bearded tits, harriers and bitterns in their nesting haunts, and perhaps also some of the rare birds of passage which occur there from time to time, and many will have memories of delightful days spent with Jim in the punt which he managed with such skill along the narrow waterways. His bird notes have been a

feature of this Report for many years and as a rule he had some record of peculiar interest.

The accompanying photograph of him was taken in the summer of 1943 and we are indebted to Dr. Stuart Smith for so kindly lending it for reproduction.

The Council also tenders its thanks to Mr. Eric Hosking for his unique study of a short-eared owl showing its enormous wing-spread ; and to Mr. Yeates for the interesting photograph of a black redstart about to feed its young, which was taken at Lowestoft during this summer.

SCOLT HEAD

The winter of 1943-44 was as mild and open as the preceding one and this may have been one reason for the absence of the rarer winter visitors both on the coast and inland. It must also be borne in mind that there are few reliable reporters in Norfolk for the time being, and that although the ban on the coast has been lifted, there are still restrictions on the use of field glasses.

The watcher of Scolt Head, Charles Chestney, still spends a good deal of his time at Cley and his records cannot be consecutive for either place.

Of the winter visitors at Scolt Head small parties of shore-larks were seen at frequent intervals from the beginning of the year until April 4th, but not more than six at any one time.

Snow-buntings were present in their usual numbers and some of these remained until early April.

Merlins, which on the Island appear to live largely on the snow-buntings and linnets, were seen frequently throughout the winter. On February 7th Chestney watched two of them chasing linnets, one of which saved itself by diving into a bush of *Suæda Fruticosa*.

Short-eared owls and hen harriers were also commonly seen hunting over the marram hills.

In the harbour the Brent geese began to arrive in the autumn and by January had formed a large flock. A few still remained as late as May 16th. It is interesting to note that these geese were much disturbed by low-flying aeroplanes, and would invariably rise from the creek and fly out to sea for a short

time when these were passing over. It would appear that the resident birds, and those of more southerly breeding grounds have become so used to the noise of planes that they no longer take any notice of them. How low these machines are at times is instanced by two pilots who on March 16th landed on the hard sand at low tide, enquired of Chestney as to their whereabouts, and then took off again for Scotland.

On January 22nd five great northern divers were in the harbour. One was judged from its behaviour to be slightly oiled.

Two long-tailed ducks, one male and one female, were noted on March 3rd.

February 9th. was an early record for a passing greenshank.

On March 15th when Chestney was repairing the hurdles protecting the base of the Hut hill, he saw three robins close by and judged them to be Continental birds.

The strong N.N.W. wind on April 3rd washed ashore quantities of horse mussels from outlying beds and provided a great feed for large numbers of gulls, mostly great black-backed and herring gulls. It is a lovely sight, as one walks through the sand-hills onto the beach, to see these handsome birds rising from the long stretch of sand in a huge black and white cloud. Most of them return as swiftly to the feast, and here and there a sagacious bird flies up with an extra large or hard mussel and cracks it by dropping it from a height on to the shingle.

The first signs of the breeding season were noted on April 10th ; sheld-ducks were inspecting nesting holes in the dunes, oyster-catchers were in pairs and ringed plovers were making scrapes.

Sandwich terns appeared on April 29th and were seen flying along the shore in an easterly direction. Soon after this some settled down on the Island and the first eggs were laid on May 15th. They gradually increased in number and eventually formed six separate colonies, each of which consisted of about 250 nests, in the dune area at the western end of the Island. The common terns nested between the colonies of Sandwich terns and spread well down the dunes in an easterly direction. Unfortunately there was a very high mortality among the early-hatched chicks and few of these survived. There seemed to be no obvious reason for this as there was plenty of

food. It would appear that common tern chicks are less robust than those of other species of terns or are possibly more prone to disease, for in exactly the same conditions there is hardly any mortality among the chicks of the Sandwich or of the little terns. It has been suggested that inter-breeding may be responsible, and it would be interesting to know whether, the same thing happens on other terneries as regularly as it does at both Scolt Head and Blakeney Point.

One pair of roseates nested on the Island this season and successfully reared two chicks.

In the following list of breeding birds estimated numbers are given :—

Common tern	...	About the usual number nested but few except late-hatched chicks were reared.
Sandwich tern	...	An estimate of 1000 nests most of which hatched successfully.
Little tern ...	...	Rather fewer than usual.
Roseate ...	...	One pair which reared two young.
Oyster-catcher	...	All the usual sites were occupied.
Ringed plover	...	As many as usual on the ternery and along the beaches, and rather more in the Hut dune area, though possibly these may have moved from the House hills where target-practice would have disturbed them.
Redshank ...	...	A good average number judging by the number of young seen near the ternery and elsewhere.
Mallard ...	...	Four nests were found but the number of young seen in July showed that more than this number of broods had been reared.
Sheld-duck ...	...	Many came to grief looking for holes in the target-area. Some hatched successfully for several broods of young were seen in the creek.

Copyright Captain G. K. Yeates

Black Redstart (female) with food for nestlings

Green plover	...	It seems improbable that they could have bred in the conditions which existed on their usual nesting ground, but continuous target-practice made it impossible to ascertain.
Black-headed gull	...	The same as above. Those eggs found on the ternery were picked up, for it is impracticable to have them nesting there.
Swallow	... ...	A pair nested over the door of the Hut.
Wheatear	... ...	Three pairs around the Hut dunes.

There were the usual number of larks, linnets, meadow pipits and pied wagtails.

Birds of passage noted during the summer and autumn are as follows :—

Common redstart. Some on the Hut hurdles on May 4th and on September 18th, when there was slight fog and a hold-up of many small birds all along the coast.

Pied flycatcher. A number seen around the Hut and on the bushes on September 18th.

Black-tailed godwit. Four noted on May 16th and twenty, in fine summer plumage on the beach on June 6th.

Black tern. One flew past Chestney's boat as he rowed home on May 23rd. He also saw one over the harbour on September 16th.

Arctic skua. On June 25th a bird of the more uncommon light form was noted. Of those seen later in the summer and autumn all were of the dark variety.

Great skua. Two were flying over the sea on August 28th.

There are three records of birds seen inland from Brancaster which are of interest :—

A stone curlew was flushed on the uplands during a shoot at Hunstanton on September 25th when Chestney was loading for Mr. Bury.

A common buzzard was seen on the same day.

Several magpies seen from the bus between Brancaster Staithe and King's Lynn. These birds once rare in Norfolk have increased very much the last few years probably because of the absence of so many game-keepers.

The western half of the Island is still used as an artillery practice range and although at first the damage done appeared superficial, the cumulative effect of constant shelling is very serious. It would seem that firing at one target goes on until everything round it is flattened; not a tree remains in the House Hill plantation, and to the west of it the dunes have been so completely removed as to leave no protection against the inroads of the sea. If it breaks through here, as it well may do, the Overy end of the island will be completely cut off.

CLEY AND SALTHOUSE

The work of repairing the damage to the East Bank, caused by the inrush of the sea in the April gale of 1943, was going on all through the winter. This disturbance, and the mild winter, was probably the reason for there being so few birds of interest seen at Cley during the first few months of 1944. Moreover the marsh has not yet recovered from the effects of the flooding, and it is unlikely to be attractive either to ducks or waders until the drainage system is improved and the salt conditions eradicated.

On April 6th the weather turned suddenly warm and the first swallows were seen passing westward. On the same day Sandwich terns were heard calling out at sea but they did not stop. On April 12th a bittern on the marsh was trying its voice and by the end of the month was booming all day long. By the end of May a few pairs of Sandwich terns and some common terns, had settled down on a small island of Salthouse Broad close to the beach. Later Chestney waded across from the East Bank and counted twenty nests but it is doubtful whether the young were reared, for now that the shingle beach is so much lower the sea percolates through it very easily and the marsh is very liable to shallow flooding.

Two pairs of bitterns again nested at Cley. On July 7th Chestney watched an adult repeatedly attack a harrier, and concluded it was protecting its young. On July 10th he heard one booming again on the marsh in front of Watchers Cottage, a late date, which leads one to suppose that a pair had been unsuccessful in rearing young earlier and were nesting again. Of the summer visitors the most interesting record is of two

spoonbills which flew in from the sea on June 8th and settled on the Big Pool. These birds remained on the marsh for some days.

A few ruffs and reeves arrived at the end of July and with greenshanks, green and common sandpipers were commonly seen throughout August.

The misty weather of September 23rd brought in a number of small birds among them common redstarts and flycatchers. Mrs. Jopling found a pied flycatcher in one of the bedrooms at Great Eye Folly, Salthouse.

Wigeon began to arrive in the third week of September and by the 28th a flock of 200 could be seen on the shallow pools of the marsh opposite the cottage where Chestney was then planting a Lonicera hedge.

The first fieldfares came in from the sea on October 12th, and on the same day very large flocks of starlings were seen travelling westward.

There was a definite movement of small birds on October 18th and numbers of skylarks, fieldfares, blackbirds and a few wrens were seen along the East bank.

BLAKENEY POINT

Thursday, July 6th, proved a good choice of day for a visit to the Point ; it was fine and warm for once and there was no aerial target practice going on over the area, so it was possible to walk over the ternery at leisure and in comfort.

The common terns were spread out over a much larger area than usual and were nesting along the whole length of beach from the Far Point to the Big Low. Compared with the number of parent birds there were very few chicks, and it was obvious that the nesting season had been a disastrous one at least for most of the earlier-hatched ones. It has been suggested that although there was apparently plenty of herring syle and whitebait about they must have been difficult to catch in the high winds and constant rain of the early summer. The parent bird, if away from the nest too long, returns to find the newly-hatched chicks cold and lifeless, and Chestney has often seen them stamping on the chicks in an apparent effort to revive them. Whatever the reason the infant mortality was obviously enormous.

There were a few nests of the Sandwich tern on the Far Point scattered around one or two newly-formed dunes there.

The little terns were not so numerous as usual. This has also been noted at Scolt Head this season, and Major Buxton reports that none have nested on the beach at Horsey.

BIRD NOTES FROM HORSEY

By Major A. Buxton

For two summers my garden, which since the flood provides the only cover in the parish suitable for birds that like the shelter of trees and bushes, has been dominated by a pair of brown owls. My rule has been to leave well alone and let everything fight it out without interference—a rule that has never been broken except in the case of one little owl, which sat on a coop and ate somebody else's chickens. Now I have been driven to break the rule again over the brown owls, which have for two seasons instituted a reign of terror. In 1943 they discovered that they could break into some of my tit boxes and they ate nearly all the young tits in the garden in addition to killing off practically every other bird that hatched including young wood pigeons, jays, blackbirds, thrushes, etc. I further suspect them of complicity in the disappearance of a pair of lesser spotted woodpeckers. Nothing had any peace and the terrified chatter was incessant, but still I held my hand. In 1944 they again started on the tit boxes, killed full-grown plovers and cuckoos and heaven knows what else; they even attacked and seriously wounded the keeper's cat and so terrified the animal that it hardly ventured from the house, and when it did so maintained a constant and terrified watch on the sky. The cat is still a nervous wreck and, with a charming family of terrier puppies disporting themselves on the lawn, I felt that an end must be made of the pair of rogues before worse accidents occurred. The owls and their family are dead, but brown owls are common enough and I hope that they will be replaced by a better-mannered pair.

The summer of 1944 was the most disappointing season that I can remember at Horsey. The scarcity of short-tailed

field mice no doubt accounted for the absence of long and short-eared owls and the scarcity of kestrels, but I can think of no reason for the lack of many other birds. In 1943 there were a great number of sedge warblers; in 1944 these were reduced to a mere sprinkling and yet reed warblers came in force. Garden and grasshopper warblers, greater and lesser whitethroats were all very scarce and no willow wrens remained to breed. On the other hand blackcaps were more numerous in the garden than in any previous season. Spotted flycatchers, of which we have always had at least two pairs round the house, were reduced to one pair at the back premises. A similar reduction is reported from other houses and gardens in the County. Tits, thrushes, robins and wrens were far below normal and the volume of sound came from blackcaps, blackbirds and wood pigeons.

Two blackcaps, one on either side of the house, were singing up to mid-July with a persistence which proved that one can have too much of a good thing. I presume that this late singing meant that they had failed to find or had lost their mates; or possibly it pointed to some disaster to their nest, an occurrence which always prefaces a renewed burst of song.

Just outside the parish are some tall thick fences by the side of a road which in some years are frequented by three or four pairs of red-backed shrikes; there were none at all last summer. The village postman reported a great grey shrike in April, and although I did not see the bird myself his excellent description of it and its habits leaves no doubt of its identity. No golden oriole has been seen or heard for the second year in succession, and only one pied flycatcher and one ring ouzel were noticed passing through in the spring.

An experiment in reseeding marshes has resulted in a much better crop of orach than of grass and it was interesting to find that yellow wagtails were particularly numerous in the area covered by this hideous plant, which ran rampant over the salted marshes after the sea-flood of 1938. This confirms my conviction that the marked increase in yellow wagtails since the flood has been due to the presence of some insect that likes salt-loving plants, possibly an insect in some way connected with orach.

I have recently come across instances of blackbirds which are freaks in their musical performances. One which lives in the Close in Norwich developed a peculiar song in the summer of 1943 and again this year, but although I suspect it of being the same bird the note was not the same in the two seasons. This summer it resembled the double whistle (first note high and the second low) with which human beings call the attention of a friend and I think that this bird was imitating a boy. A Horsey blackbird introduced at the end of his song a very ugly screeching whistle and again has only done so late in the summer.

In 1943 there appeared to be for certain birds a banned area east of a line running roughly along the Hickling-Horsey boundary past Blackfleet Broad and no shoveller, teal, bearded tit or water-rail apparently bred there. This year the line was not so marked and a few of these birds began to encroach across it. At least two pairs of water-rails established themselves to the east of it and I have reason to believe that a pair of Garganeys did so, but no common teal or shovellers. A distant explosion has the same effect on on a water-rail as on a pheasant, except that it makes it squeal and groan instead of crow.

The bearded tit behaviour has been peculiar ; a fair number wintered round Horsey Mere and two pairs in early April, which looked as if they had settled down to breed, disappeared again. Late in May however one pair was definitely located and after much trouble I found the nest when the hen was laying—the first on the Horsey property, I believe, since the flood. My conclusion is that food for the young bearded tits and certain other birds is only just beginning to reappear in this area, which received a very big dose of salt.

The bittern population was most disappointing and I doubt if there were a quarter of the birds which bred in 1943. I can think of no reason to account for the shortage which was apparent in the winter as well as in the spring. There were only three males booming at Horsey in 1944 and they were very late getting into full voice.

In 1943 there were two nests of marsh harrier at Horsey and two at Hickling ; and one nest of Montagu's harrier at Horsey.

This year a number of marsh harriers appeared early in April and I found two nests. Then both the cocks disappeared and the hens which depend on them for their food naturally deserted. One of the cocks was found shot. The same fate apparently awaited the pair of Montagu's soon after they had settled in their nesting site. The hold of the harriers as breeding birds in Norfolk, and indeed in the British Isles has always been precarious. Nearly everyman's hand is against them and I can see little hope of preventing their complete disappearance unless an area large enough to cover their wide hunting range is made permanently safe from gun and trap. People in England have, since the introduction of game preservation, become accustomed to the absence or scarcity of birds of prey, and the theory is widespread that if you have birds of prey you cannot have anything else. Those who have travelled must however have realised that this is untrue : birds of prey must of course destroy great numbers of other birds, but the supply seems somehow to meet the demand. One of the most noted examples is the marshy area on the delta of the Guadelquiver in the south of Spain called the Coto de Donana. It swarms with birds and beasts of prey—eagles, harriers and other hawks as well as lynx, wild cats, stoats and other hunters in numbers sufficient to break a keeper's heart, but there is plenty for all of them to eat. I have never seen elsewhere such quantities of wildfowl and waders, or such a mass of bird-life of every kind. Perhaps without the birds and beasts of prey there would be more still, but to some of us at least, it would be much less interesting—in fact it would be unnatural and that is the last thing that a nature reserve should be.

In the autumn of 1944 there was a marked increase of kingfishers at Horsey which became far more numerous on the Mere and along the dykes than I have ever seen them. Owing to lack of suitable sites they hardly ever breed in the parish. I have only found one nest there since 1930 and that came to nought owing to the intrusion of rats.

At the end of September, for the first time since the sea-flood of 1938, I saw several herons stalking about in the middle of a marsh near Horsey Mill. I have learnt from experience that they are stalking moles. The presence of the moles on these marshes means either that at long last the earthworms are

beginning to spread from what was Horsey Island over the land that was flooded by the sea or that some worm eggs survived the flood and have now hatched. In Holland small worms reappeared in a flooded area (Anna Paulowna polder) the third year after flooding, and if the eggs remain hatchable for three years it seems possible that they might last for five or six. At Horsey all earth worms were killed by the sea flood except those on Horsey island and on one or two stretches of bank that were just clear of the water.

On a single day in August Mr. George Crees saw three ospreys over Horsey Mere. One was sitting on the remains of a wooden target on the mere, a second flew off from a dead tree and the third was circling high overhead.

There has been since the flood only one suitable place for woodcock at Horsey, namely the Hall garden, which makes knowledge of their movements handy to acquire. We have learned to expect them during the full moon at any date after October 15th and especially if there is a strong west wind blowing at the time, which presumably makes them drop into the first available covert after a hard passage across the North Sea. This year the dates of the autumn full moons were on October 2nd which was too early, and October 31st. At the latter period there were strong west winds blowing and the garden was full of woodcock although none had been there previously this season.

There appeared to be something peculiar about the weed in Horsey Mere in the Autumn of 1944. On most days in summer and autumn there had been between fifty and one hundred swans on the Mere, but diving duck had been almost absent up to November 25th. Until that date there had been nothing but a small flock of golden eye and tufted duck, about fifty coots and no pochard. Moreover the divers all fed at the east end of the Mere whatever the wind, which presumably means that there was no suitable weed elsewhere on the mere.

Copyright

E. J. Hosking

Red-backed Shrike family

NORFOLK BIRD NOTES

By Michael Seago

Whitlingham Sewage Farm

Gadwall.—A party of six were seen on August 5th, a single bird on 7th, and one on 12th.

Dunlin.—A juvenile arrived on August 10th and stayed two days.

Ruff.—An adult male with white neck flecked black seen from July 25th to 29th. A reeve arrived on August 7th and stayed until 12th. A juvenile was present on August 18th.

Common Sandpiper.—Numbers passed through from August 10th to September 17th.

Wood Sandpiper.—Single birds were identified on August 12th, 15th and 23rd.

Green Sandpiper.—A good many seen from July 28th onwards; two were still there on November 4th. On several occasions eight or nine were seen together, and on August 29th two were seen displaying, " leap-frogging " over one another with outspread tails and half opened wings.

Greenshank.—A Party of three arrived on August 23rd, increasing to five on 29th, and remaining till September 3rd.

Breydon Water

Little Bunting.—An adult, which I believed to be of this species, was seen on a telegraph wire next to the estuary wall on September 10th. It looked like a small female reed bunting the size of a linnet. The upper-parts were brown streaked darker, the underparts were lighter streaked with black. The crown and sides of face were rich chestnut brown, and between the crown and cheeks was a very noticeable black stripe. The call notes were identical to those in the " Handbook."

Snow-Bunting.—Large flocks seen up to mid-March when they all left. First autumn arrivals seen October 6th, and big numbers again by the end of the month.

Shore-Lark.—Small parties of three seen during January.

Twite.—Large numbers arrived early in November.

Rock-Pipit.—Several seen during November.

Wheatear.—Birds on autumn passage seen from July 15th to September 22nd.

Whinchat.—Passage birds seen on September 3rd.

Short-eared Owl.—Three seen on marshes September 30th, and single birds on October 3rd and October 6th.

Peregrine Falcon.—One seen in January chasing a skylark.

Grey Lag-goose.—A party of ten arrived on estuary September 25th.

Pink-foot and White-fronted Geese.—Large flocks of both species fed on the marshes up to the end of February, and I last saw them on March 19th. Amongst these were several bean geese. A great horde of at least four thousand were seen on December 29th, 1943. First autumn arrivals seen on September 30th.

Sheld-Duck.—A few pairs bred in the vicinity, bringing their young on to the estuary in July. Over three hundred spent the winter here, and large numbers are returning now in October and November.

Mallard.—Great numbers of immigrants seen from January to March.

Gadwall.—Saw an adult on July 15th.

Teal.—Numbers remained on the estuary till March with the other duck. A big number arrived October 25th.

Wigeon.—The mild winter was an exceptionally good one for this species, and in January over two thousand five hundred were here, a thousand remained in February, and in March the spring passage birds passed through in great packs. Late stragglers remained until May 13th. First autumn birds arrived September 3rd, and large numbers returned in October.

Pintail.—A small flock of thirty spent the winter here, and during the spring passage north in March fine flocks of about fifty were seen. First autumn arrivals seen September 25th.

Shoveler.—Several remained on the estuary all winter and during March a large number of passage migrants passed through.

Black-necked Grebe.—Saw an adult diving in one of the drains on January 11th. The upturned bill and black of crown extending over eye were both noted.

Bar-tailed Godwit.—Small flocks of passage migrants seen in May, amongst them birds in the red. During the autumn very few passed through, indeed black-tailed outnumbered them.

Black-tailed Godwit.—Several passed through during the autumn, some still in summer plumage. I saw two on August 13th, one on 26th, three on September 1st, seven on 6th, one on 10th, one on 21st, one on 22nd, and one on 30th.

Curlew.—Great numbers passed through during spring and autumn migrations. A pack of over three hundred were here in early September.

Whimbrel.—A very large migration took place on May 7th, when the flats were covered with them. First autumn birds passed through on July 15th, and last ones seen on September 18th.

Knot.—A big flock arrived early in August, amongst them some birds in the red. Throughout the autumn the species was numerous together with dunlin, ringed plover, sanderling and redshank.

Common Sandpiper.—Last autumn bird seen October 17th. My latest date for this species is October 31st, 1942.

Wood Sandpiper.—Single birds seen here, where it is rare, on August 9th, 13th and 16th.

Green Sandpiper.—Several passed through during August and September. The first one was seen July 31st.

Spotted Redshank.—During the autumn migration I saw one on September 6th, one on 9th, five on 10th, two on October 3rd, two on 6th, one on 8th, one on 12th, two on 25th, and one on November 1st.

Greenshank.—Birds on autumn passage seen from early August to September 28th. A party of twelve arrived on August 26th.

Golden Plover.—First autumn birds seen August 4th, the earlier arrivals were still in faded breeding plumage. A great number arrived on November 1st, in flocks of from fifty to two hundred.

Grey Plover.—On August 13th, I saw one in full nuptial plumage, this is my earliest date for its autumn return. Several other black-breasted birds were seen during August.

Turnstone.—Small flocks seen in May and again in August and September. Those in the spring were in full breeding plumage. I also saw a pair on February 13th, this species is rare here in winter.

Oyster-Catcher.—Two pairs of non-breeders remained the whole summer, leaving in September.

Common and Little Tern.—From the end of July to early September large numbers of terns were fishing for whitebait on Breydon.

Iceland Gull.—An adult seen on the wall on January 11th. It was standing next to an adult herring gull, and this was helpful for identification. In flight the absence of black on the primaries and long pointed wings were noted.

General Notes

Siskin.—I saw several at Postwick and Thorpe in January, May, July, August, October and November. It is exceptional to see the bird here in the summer.

Gadwall.—One shot at Little Melton on January 22nd, two seen at Postwick on February 19th, and two at Rockland Broad on October 11th.

Waxwing.—I watched two feeding on haws at Stoke Holy Cross on February 20th.

Willow Tit.—A pair seen at Postwick on April 11th.

Nightjar.—Colony of several pairs located in open woodland next to the Plumstead Road two miles from Norwich.

Jack Snipe.—Late spring birds seen at Postwick, April 7th, and 11th. Also seen at Breydon during October.

Swallow.—A late bird was seen on November 2nd.

Terns.—During September large numbers of Sandwich, Arctic, common and little terns were to be seen on and off Yarmouth beach. It is reported that common and little terns and ringed plover all bred on the beach at Yarmouth and Caister.

Whimbrel.—A party of twelve flew over Great Plumstead on September 2nd.

Cuckoo.—A late adult with no nape patch was seen on August 24th.

Copyright E. J. Hosking

Short-eared Owl alighting at the nest

MISCELLANEOUS NOTES

Golden Oriole

On August 17th Mr. R. W. E. Smith saw an oriole perched on an elm tree in the vicinity of Downham Market. He had a good view of it through field-glasses, and saw the birds again on four separate occasions later.

Hoopoe

A hoopoe was shot at Salthouse at the beginning of April.

One seen on October 10th at Greenlands Farm, Gayton. (David McLean).

Waxwing

On February 15th two were seen feeding on the berries of a hawthorn close by the playground of the village school at Stoke Holy Cross. They remained for several days, and were not at all disturbed by the children playing so close to them.

Grey Wagtail

A pair nested at Taverham Mill again after an interval of several years. These birds are often seen in Norfolk during the winter months, and one was noted at Taverham by Mr. Robinson on Christmas Day, 1943.

Quail

At the beginning of August when Mr. E. C. Keith was riding over a grass field at Barsham, his horse almost trod on a quail. He says, "It flew like a Jack snipe but quite straight, and dropped like a stone into some standing barley."

This bird has been known to breed in north and north-west Norfolk for some years, but because of its skulking habits it is seldom seen.

Fulmar Petrel

The fulmars arrived at the Sheringham cliffs on April 18th, a few days earlier than last year. The hole first used in 1940 was again occupied and also another one nearer Weybourne. The birds were last seen on July 21st. (J. Barsham).

Osprey

Frequent reports of ospreys seen during the summer and autumn have come in from different parts of Norfolk. On May 7th there was one at Hickling; Major Buxton's keeper watched three over Horsey Mere at the beginning of August;

another was seen over Suffield Park by Dr. Ley during the last week of the same month, and there was one at Woodbastwick on September 19th (B.B.R.).

LITTLE AUK

On November 8th Dr. Ley saw a tiny sea bird which he believed to be a little auk fly past the Wellington pier at Yarmouth.

The following species were mentioned by the late Mr. Jim Vincent in letters received from him during the summer :—

LITTLE GULL TEMMINCK'S STINT BLACK-TAILED GODWIT

These three species, and the osprey reported above, were all seen at Hickling on May 7th. The previous night was a very stormy one.

RUFF AND REEVE

There were thirty-six on the Rush Hills and Swimcotes on September 4th, the largest number seen together during his long career at Hickling.

SPOTTED REDSHANK also seen on September 4th.

MARSH HARRIER

A pair bred in the Catfield area, and later were frequently seen at Hickling with one young bird of the season.

STRANGE NESTING SITES.

A pair of bearded tits built a nest in the reed fence of a shooting butt, and a reed-warbler hatched its brood only one and a half feet away in the same fence.

Mr. N. Tracey sends the following note on the birds nesting in his woods at North Wootton :—

COMMON REDSTARTS

These were plentiful. Six pairs nested in the wood and there were others in neighbouring ones.

WOOD WARBLERS

A bird was first heard singing on April 23rd, and on the 30th eight cocks were singing. Unfortunately the weather then turned very cold and most of these birds passed on, but one pair remained to nest.

WOODCOCK

Eight pairs bred in the immediate neighbourhood.

WILLOW TITS

A good average number bred in and around the wood. These birds are very local in Norfolk.

SNIPE CARRYING ITS YOUNG

The note which follows does not relate to the past year, but is included because of its special interest. It comes from Mr. H. Temple Owen of Moor Lodge, Reepham.

He was walking down a lane past the house in early May when his attention was attracted by a snipe calling close at hand. The bird, with several young, was in a ditch full of mud and watercress, and from a distance of about three yards was seen to pick up one of the chicks and carry it between its legs in the direction of Booton Common (a fen only two meadows distant). It was expected that the parent bird would return for the rest of the young but it did not do so, and they soon disappeared from view.

Signed (on behalf of the Council of the Norfolk Naturalists Trust)

CONSTANCE E. GAY, *Secretary*.

VIII

FAUNA AND FLORA OF NORFOLK

BIRDS, 1934—1943

Review by M. Seago.

The following list contains records of rare birds that have visited Norfolk during the ten years ending December 31st, 1943. It includes notes on the status of some of the rare species that nest in the county.

Raven.—One at Salthouse, November 1st, 1936 (R. M. Garnett).

Rose Coloured Starling.—A female at Kelling, 7th July, 1937 (R. M. Garnett and J. C. Harrison).

Golden Oriole.—Fifteen recorded in the period under review, almost all at Horsey in May and June (A. Buxton).

Mealy Redpoll.—A male at Cley, 25th to 28th April, 1935 (R. M. Garnett).

Cirl Bunting.—A pair at Hickling, 13th April, 1936 (C. A. Norris).

Ortolan Bunting.—Four at Salthouse, 12th to 16th May, 1937 (D. Powell).

Rustic Bunting.—A female at Hickling, 28th April, 1935 (J. Vincent).

Richard's Pipit.—One at Hickling, 18th to 20th September, 1936 and another in the same locality, 2nd October, 1942 (J. Vincent).

Water Pipit.—J. Vincent reported seeing at Hickling two on 17th September, 1936 ; one on 27th March, 1937 ; one 24th to 25th March, 1938, and one 29th April, 1942.

Blue-Headed Wagtail.—A pair bred at Hickling in 1940 (J. Vincent).

Syke's Wagtail.—A pair of wagtails, the male resembling this form, bred at Hickling in 1940. Another abnormal pair bred there in 1941. A pair of Sykes's were seen at Hickling on 8th June, 1943, " the male was displaying and judging from their behaviour the pair were nesting " (J. Vincent).

Black-Headed Wagtail.—One believed seen at Cley by the watcher, 13th April, 1939.

Grey-Headed Wagtail.—A male at Hickling, 11th to 21st May, 1936 (J. Vincent).

Grey Wagtail.—A pair nested at Ellingham Mill in 1937 (Mrs. Smith).

Willow Tit.—A pair bred at Kelling in 1935 (R. M. Garnett). Two pairs bred at Hickling (J. Vincent) and one pair at South Wootton (N. Tracy) in 1939. One pair bred at Hickling in 1941 (J. Vincent).

Bearded Tit.—Greatly reduced in numbers by the severe winters of 1939 and 1940, but now somewhat recovered.

Woodchat Shrike.—One on Sheringham Common, 16th May, 1942 (J. Marsham).

Waxwing.—Small immigrations recorded several years, November to March. Party of sixteen seen by J. Vincent on 27th September, 1942, the earliest recorded date of arrival here in autumn.

Red-Breasted Flycatcher.—One at Salthouse, 21st September, 1936 (Miss Barclay). Two at Scolt Head in early October, 1937 (D. Powell). An adult male at Hickling, 3rd September, 1941 (J. Vincent) and another adult male at Gt. Plumstead, 20th September, 1941 (M. Seago). One at Gt. Yarmouth, 11th September, 1943 (Dr. Ley).

Firecrest.—One seen 22nd January to 12th February, 1935, at Kelling (W. Alexander).

Pallas's Warbler.—One seen during a large-scale hold up of migrants on 12th September, 1943, along the Waxham Cut wall near Hickling (J. Vincent).

Great Reed Warbler.—One probably seen at Hickling by one of the reed-cutters on 16th May, 1941 (J. Vincent).

Aquatic Warbler.—One at Salthouse, 12th May, 1937 (D. Powell).

Barred Warbler.—One at Salthouse, 27th August, 1936 (M. Barclay and others).

Alpine Swift.—One seen over Hickling Broad by J. Vincent, 3rd September, 1935.

Hoopoe.—Single birds were reported as seen at Catfield Hall on 29th May, 1937 (Lord W. Percy) and at Horsey, 2nd and 3rd May, 1942 (A. Buxton).

Roller.—One seen by J. Vincent at Hickling in 1938.

Great Spotted Cuckoo.—An adult was seen at Hickling on 29th July, 1941 (J. Vincent, *British Birds*, November, 1941).

Snowy Owl.—One at Gunton on 27th October, 1938 (Colonel Meiklejohn).

Hobby.—A pair bred in Norfolk in 1934, but when the eggs were near hatching on 26th July, the birds disappeared.

Marsh Harrier.—Two pairs bred in 1934, 1935 and 1936; there were four pairs here in 1937 but all disappeared and no young were reared. In 1938 two pairs nested but only one young bird was hatched. In 1939 two pairs came and there was one family of young; in 1940 one pair nested but deserted the eggs; 1941: three pairs, but only one brood reared; 1942: one male, with two females, both of which had nests with broods; 1943: four pairs bred and fifteen young were ringed.

Montagu's Harrier.—Two pairs bred in 1934; out of four pairs which came in 1935, all the males 'disappeared,' but two broods were reared; there were two pairs, with one young bird hatched in 1937; in 1942, two females with one male produced five young which flew; one pair bred in 1943.

Goshawk.—One at Hickling, 25th November, 1942 (J. Vincent, in *British Birds*) and one at Elmham, 7th December, 1942 (H. Wormald).

Kite.—One seen, but the species undetermined, by E. Piggin at Hickling on 31st March, 1942 (J. Vincent).

White-Tailed Eagle.—One in Gunton Park, 27th October, 1936 (M. Barclay, *British Birds* xxx, 7). An immature bird arrived at Hickling on 22nd November, 1940 and remained until the end of the year, returning on 25th February, 1941 and staying a considerable while (J. Vincent). One was seen also near Narford Hall on 23rd December, 1940 and thereafter at frequent intervals (including 25th February) until 19th March, 1941. Another, also immature, arrived at Hickling on 11th February, 1942 and stayed for a long time (J. Vincent). An immature bird was again seen at Narford (Mrs. MacAlistar) at the end of January, 1942, but did not make a long stay there. One was seen by Dr. Sumpter at Brancaster Staithe on 8th March, 1942.

Honey Buzzard.—An immature bird was seen at Catfield on 29th September, 1934 (Lord W. Percy).

White Stork.—One over Hickling Broad, 14th June, 1942 (J. Vincent).

Spoonbill.—The largest party seen during the period under review was a flock of fifteen at Cley on 4th July, 1940. The latest date was 22nd November, 1936 (R. Harrison).

Glossy Ibis.—One seen at Hickling Broad on 12th November, 1943, by E. Piggin (J. Vincent).

Purple Heron.—An adult seen by J. Vincent at Wheatfen Broad, 7th June, 1936.

Squacco Heron.—An adult was seen at Hickling from 22nd to 27th July, 1936 (J. Vincent, *British Birds*, xxxvi.)

Little Bittern.—One at Hickling, 2nd August, 1942 (J. Vincent, *British Birds*, xxxvi.)

Flamingo.—One was seen by the watcher on Breydon from 14th to 23rd July, 1934.

Garganey.—Between two and five pairs bred annually at Hickling (J. Vincent).

Common Pochard.—Bred at Hickling in 1937 and 1940 (J. Vincent).

Ferruginous Duck.—A male was shot at Hickling, 13th January, 1941. Four were seen on the Yare at Postwick, 22nd January, 1942 (M. Seago) and one at Hickling, 2nd May, 1943 (J. Vincent).

Leach's Fork-Tailed Petrel.—Single birds were picked up at Cromer, 11th September, 1937; Blakeney, 27th October, 1939, and Breydon marshes, 7th November, 1943.

Great Shearwater.—One picked up dead on Cley beach, 27th October, 1939.

Fulmar Petrel.—Birds 'present' on Sheringham cliff in 1940 (three), 1942 (four) and 1943 (seven)—J. Marsham.

Great Snipe.—One at Hickling, 2nd January, 1939 (J. Vincent).

Southern Dunlin.—A pair bred successfully at Salthouse in 1938 (*British Birds*, July, 1938) and again twice unsuccessfully there in 1939.

Temminck's Stint.—Twenty-four have been recorded in these ten years.

Solitary Sandpiper.—One at Hickling, 1st and 2nd August, 1942 (J. Vincent, *British Birds*, xxxvi).

Little Ringed Plover.—One at Hickling in the spring of 1940 (Miss C. E. Gay and J. Vincent) and a pair on Breydon, 14th June, 1943 (M. Seago).

Kentish Plover.—Single birds seen on Scolt Head, 7th July, 1937 (Miss J. M. Ferrier); others at Blakeney Point, September, 1938 (R. Goodman) and Cley marsh, 24th September, 1938 (N. Tracy and C. Gibbs).

Northern Golden Plover.—One identified at Salthouse, 18th May, 1935 (R. M. Garnett) and two seen there 5th May, 1937 (Miss Van-Oostveen).

Avocet.—A flock of sixteen was seen on Breydon in August, 1935, the largest number recorded here for many years.

Common Crane.—Two at Salthouse, 6th May, 1937 (R. M. Garnett); two seen over Scolt Head, 12th May, 1938 (C. Chestney); one at Hickling, 21st May, 1939, was joined by another on the 23rd (J. Vincent).

Black Tern.—Between 150 and 200 seen passing through Hickling on 14th May, 1938.

Whiskered Tern.—Single birds seen at Hickling by J. Vincent on 4th and 5th June, 1939, 3rd May, 1942, 30th June, 1942 and 11th July, 1943.

White-Winged Black Tern.—Single birds seen at Salthouse, 10th June, 1936 (R. M. Garnett); Horsey Mere, 1934 (A. Buxton); Hickling, 22nd and 25th June, 1937 (J. Vincent) and Blakeney Point, September, 1938 (W. Eales).

Gull Billed Tern.—Single birds seen at Hickling by J. Vincent on 27th June, 14th June, 1938, in 1941 and 26th May, 1943.

Sooty Tern.—One reported as seen at Blakeney on 11th September, 1935 (J. Sladen Wing, *British Birds*, xxix, 187).

Sabine's Gull.—An immature bird on Hickling Broad, 19th September, 1935 (J. Vincent).

Mediterranean Black-Headed Gull.—One 'almost certainly of this species' seen at Hickling Broad, 10th October, 1939 (J. Vincent).

Iceland Gull.—Over twelve recorded between 1934 and 1943, including one as late as 6th June, 1936 (J. Vincent).

Purple Gallinule.—A bird of the year stayed on a flooded marsh at Horsey, from September 8th to October 2nd, 1937 (A. Buxton).

IX

POSSIBLE CHANGES IN THE PRACTICE OF SPORT.

By Anthony Buxton.

The upheaval of war may produce changes in the life of this country, among these possibly changes in our attitude to sport. Any such changes must have an effect on wild life and are therefore a matter of importance to naturalists, whether they have sporting instincts or not. Sport is conducted in different ways in different countries and the effects on wild life of the various systems are therefore already known. It may perhaps be of interest to review impartially some of these systems and the resulting conditions.

Nobody ,who has had experience abroad, could contend that our practice in sport is democratic. The nearest approach to democratic sport, apart from shooting on the coast, that I know of in England, is the system of sporting licenses in the New Forest. A number of such licenses are issued each year to local inhabitants entitling them to kill game in the forest, and I understand that keen and active sportsmen enjoy fair sport, provided they have good dogs. This, however is not really a parallel case to conditions in other countries for the New Forest is constantly restocked from the private estates that surround and in some cases lie within its boundaries.

Switzerland is a highly developed and essentially democratic country, and it seems therefore appropriate to begin by considering the practice in that country. The contrast between this country and Switzerland is shown at once by the fact that there is *no* private shooting or fishing in Switzerland. The only safeguard of privacy that I can remember is the rule that no shot may be fired in a private garden or within 200 yards of a house. I was once abruptly reminded of this rule by a pyjamaed figure from an open window in the early hours of the morning, while I was casting a pack of beagles across a lawn. "Don't you know" said the voice "that you are not allowed to shoot within 200 yards of my house." My reply "I hav'nt got a gun" silenced the owner, who retired in amazement into his

bedroom. The rule of free access is well illustrated by the fact that I never had to ask leave from a single farmer to hunt with my beagles over his land.

Apart from the rule relating to houses and gardens anyone with a shooting licence obtained from the Canton (County) can go where he chooses, provided that he does no damage to crops. Similar practice obtains in regard to fishing. There is no private water, fishing licences are cheap and the number of licences is large. Anyone who possesses a licence and can prove that he is there for the purpose of fishing has a right of passage along any water course. The only exception to this rule of access to every part of the country and to every river and lake is certain reserves, permanent or temporary, established by the State or the Canton. There is for instance an extensive National Reserve established especially for the larger animals and birds, bears, chamois, eagles, etc., and valleys are also closed for a period of years to all sportsmen in order to allow the stock of game such as chamois, etc., to increase. On rivers certain lengths are reserved for the same purpose to insure survival of stock and as reserves from which to obtain fish for restocking other waters.

There are no gamekeepers, in our sense of the word, but there are *gardes champetres*, one of whose duties is to see that there is no poaching : their work in this respect is fairly simple. The shooting season opens in Switzerland on the first Sunday in September and closes early in January.and during that period anyone with a licence can shoot where he likes, except in reserves and the immediate vicinity of a house. During the rest of the year any shot fired constitutes poaching for there are no exceptions such as the killing of vermin or other out of season methods of destruction.

The effect on wild life of almost universal access by large numbers of shooters during a short open season is profound. In order to encourage the taking out of shooting licences the authorities restock with a limited number of partridges pheasants and hares obtained from abroad and give great publicity to this restocking (*repeuplement de la chasse*). I have watched but not participated in the shooting on the opening day of the season. I remember seeing three separate pairs of sportsmen all with dogs converging on one covey of partridges.

The result is obvious, no bird with the stay-at-home habit of a partridge or a pheasant can survive. It is almost true to say that they are all dead by breakfast time on the first morning, and the vineyards, which are closed to shooting until the grape harvest in October, only save temporarily a small proportion of the hares. Rabbits are non-existent and in any case could not survive. In short practically no bird or beast of sedentary habits that is looked on as fair game can survive and stock must be replaced each year. The only exceptions are produced by inaccessibility or thickness of covert, such as in the case of capercailzie, blackgame, ptarmigan and hazel hen : in fact not many of these survive. With migratory birds the position is different. There is a regular and comparatively short passage of woodcock through Switzerland in November and this provides what is generally considered the best form of shooting in the year. The woodcock are widely scattered over large tracts of wooded mountains and to find them is no easy matter. Special dogs, which point them, are used and carry bells on their collars. When the bell ceases to ring the sportsman looks for his dog—and the woodcock. Anything more than a brace in a day is considered satisfactory and the woodcock seem to survive the ordeal. Moreover the Swiss do not shoot woodcock as do the French and Belgians on the return migration in March, when woodcock flighting may be rather deadly, for the birds are paired.

Much the same thing may be said of mallard. The approach to wildfowl on the many open lakes is extremely difficult. On the lake of Geneva quite a number of diving duck, mainly pochard and tufted, spend the winter in harbours such as the harbour of Geneva, which is surrounded by the town and a sanctuary from shooting. This results in a rush to town of duck from the open lake at the sound of a shot, and in the harbour tufted and pochard have learnt that they are safe from disturbance and swim and dive within a few yards of steamers and ferry boats, whereas on the open lake outside they are almost unapproachable. The toll taken of both duck and woodcock is probably not very serious.

I had no experience of chamois-shooting in the Alps but I gather that the system of opening and closing of valleys results in a rapid diminution of the game after the opening of an area,

and the slow building up of stock during a closed period. The system has at least insured the continued existence of this delightful animal in the Swiss Alps.

The question may well be asked whether it is not the practice for so large a body of sportsmen (1000 shooting licences are taken out in a year in the small Canton of Geneva alone) to shoot at anything they see. The answer is no. Their ideas are not quite the same as ours as to what is fair game and what is not, but they discriminate roughly on the lines of what is good to eat and what is not. A clear indication of the number of shots likely to be obtained is the fact that all guns are furnished with a sling and are normally carried slung on the shoulder. I remember meeting a Swiss acquaintance in the middle of the morning on the opening day. He was returning home after shooting on the marshes of the Versoix river since dawn and told me " I have five pieces and therefore I am content." They consisted of 1 duck, 2 water hen, 1 water rail and 1 landrail.

The Swiss and the French look upon thrushes much as we do upon snipe, and for a natural reason. They are good to eat and they are almost entirely migratory in Switzerland and France. Song thrushes nest sparingly in the mountain forests, but I only knew of one place on the plain of Geneva where they bred. They do, however, pass through in large numbers in October and March and are generally found in vineyards. Missel thrushes are more or less resident in the mountains and in very hard weather fieldfares and redwings appear by unfrozen streams and marshes. Blackbirds and small birds generally are not shot and the craze for collecting specimens is conspicuously absent. I never saw cases of stuffed birds in a Swiss private house, and specimens seem entirely confined to Museums. The absence of gamekeepers means that there is no regular campaign against birds or beasts of prey but no doubt some of the sportsmen would during the open season shoot at buzzards, which are very common, and at other hawks.

The Swiss do not shoot birds or beasts because they are rare, they shoot them because they are good to eat or because their pelts are valuable. They include foxes and badgers in the bag for both reasons. I was told by a Swiss sportsman that he

would rather eat a fox-cub than a hare, but he disliked the taste of an old fox. No one ever says simply that he has shot a hare or a fox. It is always a hare that weighed say 6 lbs. and a fox whose pelt was worth 40 francs. Badgers and foxes are fairly numerous partly owing to the extent of mountain forests and also owing to the impossibility of digging up earths in a rocky soil or the long land drains which the animals also use. There is general agreement on the excellence of badger hams.

The effect of heavy fishing is less than the effect of heavy shooting. Except in the lakes fish consist mainly of trout with grayling in the lower reaches of the rivers. Rivers are restocked when necessary and as in the case of shooting the authorities encourage the taking out of fishing licences. The price of a licence varies according to Canton. For instance a licence cost 5 francs for Geneva, but 45 francs for Neufchatel and the difference was justified. Licences for netting in the lakes are much more expensive. I fished a great deal within reach of Geneva and consider the licence cheap for the sport enjoyed, but it was not easy fishing for the number of fishermen insured the death of the fools and the survival of only the intelligent fish. That did not spoil sport but it made success very sweet. The valley of the Areuse near Neufchatel provides a good example of the effects of democratic fishing. The river is gin clear and slow, the valley is full of watch factories and a large proportion of the hands fish. Their rods and gear are very cheap but the difficulties of the water make essential for success a high standard of fishing and the standard is extraordinarily high. There are plenty of fish, some of them big and there is certainly no lack of fishermen. On one occasion five of us including myself were on one bank and two on the other all fishing in turn for a large grayling, rising steadily in midstream. After about an hour one of the fisherman on the other bank rose and caught it, a fish of about 2 lbs. He hurled it back in disgust for grayling at the moment were out of season, but to hook that highly educated fish on tackle that would not have cost over 5 francs, was a mark of real skill. There are of course drawbacks to democratic fishing ; five is rather a crowd for one fish and it is a little upsetting when you have patiently crawled to within shot of a rising trout, to hear a cheery

greeting from an upright figure at your back as he hurls a minnow to the spot where your fly was about to alight, but difficulty is the essence of sport and I thoroughly enjoyed myself in overcoming or failing to overcome it. Luckily for the fish and for the sport generally, bad fisherman far outnumber good ones in Switzerland as elsewhere, and the Government sees to it that the rivers are well stocked.

Much space has been devoted to Switzerland because it gives an example of sport conducted on what might be called extremely democratic lines. To our ideas the French system is democratic enough, but it is a stage up or down (whichever you like to call it) from Switzerland for to a limited extent there are shooting preserves. (Chasses privées). I need not deal with these exceptions for in most of France sportsmen can go where they will in search of game and in their open areas the main difference between France and Switzerland lies in the fact that the shooting season is much longer. For instance duck and woodcock may be, and are, shot in France and in Belgium in March during their Spring migration. In my opinion this is a grave mistake from every point of view ; both these birds are then paired and in these two countries, although for some reason woodcock do not stay to nest, mallard attempt to do so and the destruction in the early Spring is very serious.

In those parts of France with which I am acquainted a Frenchman's idea of what is game is much the same as in Switzerland. It is not true to say that a Frenchman shoots at everything, but I understand that it comes nearer to the truth in the South of France than elsewhere.

In Switzerland and in the parts of France that border it there is a more general knowledge of natural history than in England and there is in my experience no destruction by mankind of nests. Among the great number of nests that I found I can remember no instance of wilful destruction by schoolchildren or anyone else. School education at least in Switzerland is on a very high standard and it includes education on natural history. Among young and old the knowledge of animals, birds and plants is very high. As an instance of knowledge of birds by a Frenchman, I was photographing a pair of grey-headed woodpeckers just on the French side of

the frontier and my hide by a tree in a fence was extremely obvious. These woodpeckers are rare in the district, but the local farmer knew all about them and the difference between them and green woodpeckers and was extremely interested in the results of my photography and in the well being of the woodpecker family. He seemed proud that they should have nested on his land. If birds, beasts and fish have a worse gauntlet to run in the winter in France and Switzerland than in this country they are much safer there than here in the breeding season.

The next country to be taken shall be Norway, another thoroughly democratic country, and it is of special interest in one respect for like Scotland it is the home of grouse. Grouse are called dal ryper in Norway and in that country they go white in winter and have white wings even in summer, but they are grouse all the same, behave in exactly the same way as our grouse and make exactly the same noise and when turned out in Scotland gradually lose their white feathers. They constitute a parallel case to stoats, which in Scotland nearly all go white in winter, whereas in Southern England most of them remain brown.

Not many years ago British delegates requested the postponement of an International Assembly from the beginning to the middle of September and gave all sorts of political reasons for their request. A Dutch delegate, who had a good working knowledge of British habits and tastes blew these political causes to the winds. "I know the real reason" he said, "Its grouse, grouse, grouse and nothing but grouse." The opening of the ryper season, wisely postponed till about August 20th in Norway, causes quite as much excitement in that country as does the 12th of August in this. Ryper ground in Norway is in most places far less accessible than grouse ground in Scotland, but large numbers of Norwegian sportsmen make expeditions after ryper, and in most places shooting is free. I was once on the Hardanger Vidde after ryper and as it was a good season for the birds I saw large numbers of them and several golden eagles hunting them. Inaccessibility prevents I think any danger of serious diminution by shooting, but large numbers of ryper, many of which find their way to the British market, are snared in the snow.

The extent of the forest in Norway is a safeguard for other game birds such as capercailzie, blackgame and hazel hen. In most parts of Norway that I have visited there is a shortage of birds of prey and I understand that the authorities have encouraged their destruction. In my opinion they have overdone it. Norwegians are quite as particular as we are about what they shoot and what they do not and there is no general destruction and no lack of those birds which find that rugged country to their liking. I forget whether the Norwegian Government issues shooting licenses, but I have certainly never taken out a fishing license in that country, and have never been able to understand the Government's reluctance to charge a fishing license. In view of the sport available I cannot imagine that anyone would regret paying a reasonable sum for their license. and the income received might be considerable.

I have spent far less time in Sweden but learnt something about the regulations relating to elk. Each county decides annually, after estimating its stock of elk, the opening and closing of the shooting season. If the stock is considered too small they may decide that there shall be no open season at all. In any event the season is very short, seldom longer than a fortnight, but during that time many people are after them. I was told that there is a far larger head of elk in the Southern portion of the country than in the north, owing to the difficulty of preventing poaching in the less accessible parts of Sweden. The Swedes seemed to me to have very much the same ideas about sport as ourselves, and are far too interested in their wild life to allow destruction to exceed the danger limit, and the same may be said of the Dutch.

The United States, after an orgy of destruction, have passed the strictest regulations concerning shooting and I understand that these are already causing a definite improvement in the status of game which had become dangerously low. Their system is far more democratic than ours.

The Germans, Austrians and Hungarians probably know more than anyone else in Europe about the art of stalking in timber. My personal experience in this respect has been confined to Austria and to a time when the habits of the country regarding sporting facilities were no more democratic than our own. I understand however that more recently facilities have

been made more general, but that they are accompanied by strict and very sensible regulations. For instance so much is charged for the killing of a stag or chamois, and a very heavy fine is imposed for the loss of a wounded beast. This is a good deterrent against long shots and indiscriminate shooting.

Fishing in Austria is popular ; in Germany it seems to be looked upon purely from the point of view of the kitchen. Germans, in contrast to Frenchmen, do not seem to possess fishing instincts. The owner of an inn in Austria, much frequented for fishing by foreigners stated as his opinion that out of 10 Frenchmen all could fish, out of 10 English one, and out of 10 Germans none. I agree with that estimate.

To sum up, in a country so generally accessible and so thickly populated as our own, democratic practice in shooting must either reduce to vanishing point non-migratory game, or at least make their continued existence depend entirely on artificial measures such as annual re-stocking, and severe reduction of the open season. Its effect on migratory creatures is far less, but even for these strict and easily enforceable regulations are required to prevent too much destruction. Fair fishing, however heavy, will not lead to extinction but to a high level of education in the survivors. Moreover restocking of fish is comparatively easy. Netting, however, and other still more destructive methods can soon lead to a dangerous situation. On the whole it is true, however, that the more universal the fishing, the greater is the feeling against poaching. My capture of a notable poacher was popular.

To be more precise if we became as democratic in sport as the Swiss, abolished private sporting rights, gave free access everywhere (except to reserves) to all holders of licences, the stock of resident game such as pheasants and partridges, even with a shortened shooting season, would very soon be so reduced that to prevent extinction annual restocking would be essential. The migratory birds, such as duck, woodcock and snipe would no doubt be reduced, but not to extinction. Unless there were a great advance in the knowledge of natural history in this country, many birds and beasts, other than game, would suffer from the introduction of more democratic legislation. The result as regards fishing would be less drastic but fishing standards would have to rise to compete with the rise in education of the fish and restocking would be constantly required.

X

NORFOLK COUNTY LIST OF FUNGI—PART V.

(Continued from Trans. Norf. & Norw. Nat. Soc. XV, 227).

By G. J. Cooke.

Abbreviations as used at XIV, p. 469, with the addition of " L.W." (L. S. P. Welander).

807. *Clitocybe nebularis* (Batsch) Fr.—V.C. Salhouse, 2/4/1857 (R. Ward) ; Wickmere, Scole and Sparham, Oct. and Nov. (Plowright, 1872). " Not common in W. Norfolk " (C.B.P.). Brandon, 8/11/1876 (C.B.P.) ; Stratton Strawless, 18/10/1910 to 21/10/43 ; Colney Park, Oct. 1913 ; Beech Grove, Drayton, 11/11/14 et subseq. ; Felthorpe, 15/11/16 (G.J.C.) ; Holt, Dec., 1927 (C. P. Petch) ; Framingham, 6/11/28, 6/11/30, 16/11/31, 11/11/36, 23/11/37, in a pine wood. Stratton Strawless, 4/10/34 (B.M.S.) ; Woodlands Park, Norwich, Dec. 1936 ; Mousehold, very abundant, 16/11/36—17/12/36, and on various dates ; Newton St. Faith's Common, 14/10/37 ; Gt. Melton, 9/10/35 ; Drayton Brecks, 9/11/35 et subs ; Earlham Park, 6/10/37 to 6/11/42 ; Eaton, Thorpe Woods, Mangreen, etc. in the Norwich district in which, contrary to Plowright's experience in W. Norfolk, we find it very abundant. Sheringham, 30/10/36 ; East Wood, Cromer, 24/11/42 ; Westwick, 13/10/42 ; Smotton Common, Saxlingham, 23/11/41 ; Wroxham, 28/10/43 ; Little Plumstead, 3/11/43 ; Surlingham Wood, Whcatfen Broad, 27/10/34, 24/10/35, 29/10/39 and Rockland St. Mary, 11/11/42 (E.A.E.). Weasenham Wood, 3/9/42 (E. W. Clarke). Mostly a late season species.

808. *C. clavipes* (Pers.) Fr.—C. " Common " (C.B.P., 1872). Not so common as the last, but frequent in many woods. Drayton, 11/11/1914 ; Stratton Strawless, 26/9/16 et subs. to 21/10/43 ; Horsford, 17/10/19 ; Holt, Dec. 1927 (C. P. Petch) ; Holt Lowes, 27/8/36 ; Sheringham, 30/10/36 ; Mousehold, 19/10/36 ; Thorpe Woods, 14/11/39 —14/11/42 ; Felbrigg Great Wood, 24/9/38 ; Earlham Park, 9/10/43 ; Westwick and Stratton Strawless, 3 and 4/10/34 (B.M.S.). Westwick, 8/10/36 ; Surlingham Wood, Wheatfen Broad, 24/10/35, 6/11/36, 5/11/37 (E.A.E.).

811. *C. gangrænosa*, Fr., var. *nigrescens* (Lasch) Cke.—" Ringstead, 1870. Pileus cream-coloured, gills crowded. The whole plant turns dark blue, then ash grey, when bruised. Lasch, Linn. No. 521 ; B. and Br. Annals N.H. No. 1199 ; Fr. Ep. p. 149, Ag. mundulus " (C.B.P., 1872), under *Agaricus nigrescens*. We copy this from Plowright here, but believe it to refer to *Clitopilus mundulus*, var. *nigrescens* (Lasch) Fr. (see No. 962).

813. *C. inornata* (Sow.) Fr.—R. Felthorpe Woods, under deciduous trees and herbage, 24/10/1919. Sheringham, among leaves in mixed wood, mostly coniferous, 30/10/36.

816. *C. hirneola* Fr.—" Norfolk " (C.B.P., 1884).

825. *C. aurantiaca* (Wulf.) Studer.—" Very common in W. Norfolk " (C.B.P., 1872). It is often common in E. Norfolk, but we do not meet with it so frequently as, apparently, Plowright did. Felthorpe, c. 1872 (K.T.) and 5/11/1910 ; Stratton Strawless, 11/10/1904 ; Horsford Heath, 16/9/04, 31/10/11, 11/11/14 ; Carr's Hill, Costessey, 26/11/21 ; Northrepps, West Runton, Westwick, Sprowston, Wheatfen Broad, Holt and Swanton Novers, Oct. 1934 (B.M.S.) ; Drayton Woods, 15/10/38 ; Drayton Drewray, 30/8/41 (H.B.D.) ; Newton St. Faith's Common, 28/10/37 ; Honingham, 9/11/37 ; Framingham, 16/10/37 ; Mousehold, 7/10/35, 26/9/39, 11/11/43 ; Racecourse Wood, Thorpe, 18/11/42 ; Cockley Cley, large and abundant, 8/10/40 ; Shropham Carr, 22/10/40 ; Earlham Park, on larch roots, 6/11/42 ; Felbrigg Great Wood, 24/9/38 ; Weasenham Wood, 3/9/42 (E.W.C.). Often on open heaths about old gorse roots and where pines have been felled.

var. *albida* (Gillet) Rea—Surlingham Wood, Wheatfen, 7/1/1934 ; Westwick and Buxton Heath (Hevingham), October, 1934 (B.M.S.) ; Honingham, 9/11/37. Uncommon.

var. *lactea* (Quél.) Rea—Horsford Heath, 11/11/1914 ; seen later in various localities ; not uncommon. Differs in being entirely pallid.

var. *nigripes* (Pers.) Rea—Horsey sea flood area, 15/11/1940. Drayton, 29/11/41 and elsewhere, mostly in boggy places ; not uncommon.

827. *C. odora* (Bull.) Fr.—F.C. Earsham Wood (T. Woodward). " In a shady wood, Cossey, 1859 " (K.T.). " Common " (C.B.P., 1872). Sparrow Lane, Framingham, 27/9/1904, 15/10/13. Stratton Strawless, 25/10/10 and various dates in September and October to 14/10/43 ; Sprowston Wood, 15/10/14 ; Felthorpe, 26/9/16 ; Eaton Park, 24/10/24 ; Honingham Brecks, 25/10/38 ; Mousehold, 26/9/38 ; Ketteringham, 18/10/38 ; Dunston and Mangreen, 19/10/43 ; Earlham Park, 16/11/42 ; Little Plumstead, 2/11/43 ; Westwick, 3/10/34 (B.M.S.), and 13/10/42 ; Wheatfen Broad, 6/8/36 (S.A.M.) ; Keswick, 28/8/41 and 17/9/41 (L.W.) ; Northrepps Wood, 17/11/42 (L.W.). We find this species rather uncertain in its appearance in some woods. It was especially plentiful in 1941.

829. *C. trogii* Fr.—R. Honingham, in a deciduous wood, 8/7/34 and 12/9/34. This plant is almost white, exceedingly rugged about the stem and exceptionally fragrant.

830. *C. rivulosa* (Pers.) Fr.—F.C. In the Norwich district we find it very common, less so in other areas. " Castle Rising, 23/10/1896 " (C.B.P.) ; Middleton, 11/9/97 (C.B.P.) ; King's Lynn, 17/11/98 (C. Rea) ; Westwick, 3/10/34 (B.M.S.) ; Eaton, 28/10/34 and annually. Cringleford, Colney, 30/9/37 and various dates. Earlham, 6/11/42 ; Mousehold, various dates. Old Lakenham and Harford Bridges (E.A.E.), 18/10/38 ; Postwick Grove, 24/10/41 ; Easton, 5/11/37 ; Drayton, 18/11/38 ; Sheringham, 30/10/36 ; Wheatfen Broad, 12/11/39 ; Weston, 14/11/41 ; Brundall, 30/9/43 (E.A.E.).

831. *C. cerussata* Fr.—N.I. West Runton, 8/10/32 ; Sheringham, 5/10 and 23/11/32 ; Colney Park, 9/10/35 ; Drayton Woods, 15/10/38 ; Mangreen, 28/8/41 (L.W.).

var. *difformis* (Schum.) Fr.—U. Drayton, in dense spruce wood, 18/11/38.

832. *C. phyllophila*—F.C. " Folly Wood, Rising, 1872 (C.B.P.). Felthorpe, 11/10/1904, 5/11/19 ; Sprowston Wood, 7/11/19 ; Attlebridge, 3/10/15 ; Dunston, 11/11/16 ; Drayton, 30/10/19 ; Woodlands Park, Heigham, 3/9/20 ; West Runton, 5/10/32 ; Sheringham, 8/10/32 ; Felbrigg Great Wood, 12/10/38 ; Racecourse Wood, Thorpe, 28/11/39 ; Keswick, 7/11/42 and 26/10/43 ; Brundall, 4/10/43 and Wheatfen, 27/10/43 (E.A.E.). Occasionally in ring formation under elm or beech trees.

833. *C. pithyophila* (Secr.) Fr.—F.C. Wheatfen Broad, 24/10/35, etc. (E.A.E.) ; Drayton Woods, 15/10/38 ; Felbrigg Great Wood, 12/10/38 ; Mousehold, 13/12/38 to 11/11/43 ; Swanton Novers, 23/10/40 ; Thorpe Woods, 8/11/42 ; Earlham Park, 6/11/42 ; Keswick, 26/10/43 ; Blofield Hall, 2/11/43 ; Easton, 8/10/41 (L.W.).

835. *C. candicans* (Pers.) Fr.—N.I. " Norfolk " (C.B.P., 1884) ; West Runton, 2/10/34 (B.M.S.) ; Framingham, 7/12/34 ; Drayton Brecks, 22/12/34 to 12/10/40 ; Earlham, 3/11/36 ; Felbrigg Great Wood, 12/10/38 ; Blakeney Downs, 23/10/40 ; Stratton Strawless, 11/12/41 to 21/10/43 ; Eaton Golf Links, 24/10/42 ; Dunston, 20/11/42.

836. *C. dealbata* (Sow.) Fr.—F.C. " Norfolk " (C.B.P., 1884). Ringland Hills, 10/10/1904 ; Carr's Hill, Costessey, 7/11/23 ; Framingham, 6/11/28 ; Haynford, 9/11/33 (E.A.E.) ; Lion Wood, Thorpe, 6/11/35 ; Sheringham, 30/10/36 ; Mousehold, 8/11/37 ; Drayton, 18/11/38 ; Bluebell Hole, Eaton, 18/10/40 ; Smotton Common, Saxlingham, 28/8/41 ; Eaton Links, 21/10/42 ; Earlham Park, 11/11/42 ; Racecourse Wood, Thorpe, 9/10/43 ; Stratton Strawless, 24/10/41 (L.W.), 24/9/42, 21/10/43 ; Brundall, 30/9/43 (E.A.E.).

var. *minor* Cke.—F.C. Earlham, 11/11/42 ; Eaton, November, 1942-3.

837. *C. gallinacea* (Scop.) Fr.—U. Carr's Hill, Costessey, 7/11/23. Cley Bank 23/10/40. Probably this species has often been overlooked when the pungent smell has not been evident.

840. *C. cartilaginea* (Bull. non Fr.) Bres.—Keswick, at the base of an elm trunk, 11/9/41 (L.W.). Thorpe, 7/11/42.

841. *C. aggregata* (Schæff.) Fr.—Westwick, 9/10/1933.

849. *C. opaca* (With.) Fr.—U. Stratton Strawless, 20/10/32. Felbrigg Great Wood, 12/11/38 ; Northrepps Wood, 17/11/42 (L.W.). In some respect resembling *C. cerussata*, but distinguishable by its silky lustre and hard fibrillose stem.

850. *C. maxima* (Fl. Wett.) Fr.—R. " Not uncommon, Rising " (C.B.P., 1872). Blickling Park, c. 1872 (K.T.). Brandon, 8/11/76 (C.B.P.). It is possible that these records may refer to *Paxillus* (*Clitocybe*) *giganteus* (Rea No. 1813), a much commoner species in our experience, but which did not appear in Plowright's records until his

1884 list. Our only certain record of *C. maxima* is of specimens found under oaks and elms at Sprowston Park, 27/11/1938. This species may be known from *P. giganteus* by its longer, hard stem and darker, rivulose pileus, and from *C. geotropa* by its equal, not bulbous, stem and its darker, browner colour.

852. *C. infundibuliforme* (Schæff.) Fr.—V.C. "Common" (C.B.P., 1872). Stratton Strawless, 13/10/1911 to 21/10/43; Blofield, 25/8/12; Pedham Lake woods, 3/9/16; Framingham, 8/11/30 to 28/9/38; Northrepps, West Runton, Westwick, Wheatfen Broad and Kelling Heath, 2–5/10/34 (B.M.S.); Colney Park 9/10/35; Mousehold, 19/10/36 to 11/11/43; Sprowston Wood, 10/10/38; Honingham, 9/11/37; Saxlingham, 27/7/37; Easton, Ringland and Racecourse Wood, Thorpe; Weasenham Wood, 3/9/42 (E. W. Clarke). It is found in slightly varying form in most wooded areas we have visited.

var. *membranacea* (Fl. Dan.) Fr.—Felthorpe Woods, 24/10/19; Drayton Drewray, 13/7/20.

853. *C. trullæformis* (Fr.) B. & Br.—"I believe this plant is not of uncommon occurrence on exposed heaths, etc." (C.B..P, 1872).

854. *C. incilis* Fr.—"King's Lynn, November, 1881" (Cke. Ill., 153, t.281). 1884 list (C.B.P.). "Castle Rising road each year within twenty yards of the spot where I first found it in 1880" (C.B.P. in Mason's *Norfolk*).

855. *C. sinopica* Fr.—North Wootton Heath, 14/5/1907 (C. Rea).

857. *C. gilva* Fr.—"Sandy Denes of Yarmouth" (M. J. Berkeley, pre–1836—see *Eng. Flora*, V, Cryptogamia, pt. 2, Fungi, p.32). Pretty Corner, Sheringham, 5/10/32.

858. *C. subinvoluta* W. G. Sm. non Batsch—"Pine groves, Norfolk—Mr. Woodward" c. 1791. Hudson's Flora. Felthorpe, 10/1910, 2/11/11; Ringland, 4/11/11; Attlebridge, 18/7/16.

859. *C. geotropa* (Bull.) Fr.—N.I. "Very elegant in form when well grown; usually it does not appear before the end of October or beginning of November" (C.B.P., 1872). With these remarks we entirely agree. Ketteringham, under oaks, 16/10/13; under horse chestnuts, 8/11/38. Under oaks, Eaton Park, 12/9/15; Carr's Hill, Costessey, 26/10/21; Colney Park, 9/10/35; Sheringham, 30/10/36.

860. *C. splendens* (Pers.) Fr.—Earlham Park, Nov. 1933; Eaton Park, 20/11/34; Dunston Common, 14/12/34 (det. C. Rea).

860*. *C. paradoxa* Cost. & Duf.—A group or two of this species was first found under some old larches standing in the open park at Earlham, 9/11/1927 and from then onward it appeared annually, as a rule two crops of sporophores being produced, in late September and late November respectively, each year. In some seasons it persisted into December, when, apparently owing to drought, no specimens had appeared in September; latest date, 12/12/38. This colony was last seen on 6/11/42, when numbers appeared to be decreasing, and was not found in 1943. This species was first recorded in Gt. Britain at Great Missenden, Bucks., in 1926; subsequently also at Burnham Beeches and a few other places.

861. *C. inversa* (Scop.) Fr.—F.C. "North Wootton" (C.B.P., 1872); Beech Grove, Drayton, 11/11/1914; Framingham, 15/11/16; Attlebridge, Nov. 1916; Eaton, 1/11/26; Keswick, 2/11/28; Sprowston Wood, 5/10/34 (B.M.S.); Wheatfen Broad, 6/11/36, 24/10/40 (E.A.E.); Bawburgh Hangings, 25/10/38; Earlham and Heigham; Felbrigg Great Wood, 24/9/38; Intwood, 24/10/42; East Wood, Cromer, 24/11/42.

862. *C. flaccida* (Sow.) Fr.—V.C. "Castle Rising, abundantly in rings in the fir woods" (C.B.P., 1872); Attlebridge Woods, 2/10/1912, 3/10/15; Stratton Strawless, 26/9/13 to 21/10/43; Keswick, 15/11/16; Framingham, 1/11/28 to 23/11/37, in rings under spruce and larch; Westwick and Wheatfen Broad, 3/10/34 (B.M.S.); Colney Park, 22/11/35; Earlham, various dates; Gt. Melton, 9/10/35; Mousehold, 19/10/36; Eaton, 22/5/37; Dunston, 18/12/42; Wroxham, 28/10/43.

var. *lobata* (Sow.) Cke.—Sprowston Wood, 7/11/19, under conifers; Dunston, 13/11/30.

866. *C. tuba Fr.*—Drayton Woods, on dry pine needles, 5/11/38 (G.J.C. & H.B.D.); Smotton Common, 28/8/41; Stratton Strawless, 21/10/43; Wheatfen Broad, 9/11/33, 25/10/40 (E.A.E.).

867. *C. ericetorum* (Bull.)Fr. U. Wolferton, 8/9/1900—C.B.P. Racecourse Wood, Thorpe, 14/11/42; Stratton Strawless, 21/10/43.

868. *C. cyathiformis* (Bull.) Fr.—"Common late in autumn" (C.B.P., 1872). "A pasture, Ringland, 1866" (K. Trimmer). Taverham Heath, 14/11/1931; Weston, 14/11/41 (E.A.E.); Drayton, 26/11/41 (G.J.C. & H.B.D.); Little Plumstead, 2/11/43. These are all the records we have of this species, and with the exception of the last-named are all within a circumscribed area. Plowright's comment therefore cannot be said to hold good for E. Norfolk.

869. *C. expallens* (Pers.) Fr.—Norfolk (C.B.P., 1884 list). Bawsey, 11/9/1897 (C.B.P.). Earlham Park, 5/12/28, 26/11/40, 11/11/42; Drayton Brecks, 27/12/34.

871. *C. obbata* Fr.—North Wootton, 25/10/1896 and Mintlyn Wood, 5/10/01, (C.B.P.).

873*. *C. vibecina* Fr.—C. Horsford, 12/12/1911; Carr's Hill, Costessey, 7/11/23; Drayton Drewray, 11/11/32; Sheringham, 4/11/32, 30/10/36; Westwick, 17/10/35; Earlham Park, 22/11/35; Mousehold, 2/12/35 to 11/11/43; Thorpe Woods, various dates; Drayton Brecks, 9/11/35; Framingham, 23/12/37; Dunston Common, 19/10/39 to 7/1/43; Wroxham Avenue, 28/10/43; Eaton, 25/10/43; Northrepps, Stratton Strawless, 2 and 4/10/34 (B.M.S.); Newton St. Faith's Common, 14/10/37; Wheatfen Broad, 29/10/39 (E.A.E.).

874. *C. suaveolens* (Schum.) Fr.—Beeston Regis, 22/9/1932; Northrepps, Westwick, Sprowston, Framingham Chase, 2–5/10/34 (B.M.S.); Stratton Strawless, 17/9–3/10/41, 21/10/43; Dunston, 26/11/41; Wroxham, 28/10/43; Wheatfen Broad, 29/10/39 (E.A.E.).

875. *C. brumalis* Fr.—Given by C.B.P. in 1884 list of Norfolk fungi. Records of this species should probably be put under *C. vibecina* Fr. as above.

877. *C. metachroa* (Fr.) Berk.—Norfolk (C.B.P., 1884 list).

880. *C. ditopus* Fr.—Dunston, 13/11/1923 ; Framingham, 5/11/32 ; Stratton Strawless, various dates ; Westwick Woods, 3/10/34 (B.M.S.) and 13/10/42 ; Smotton Common, Saxlingham, 23/11/41 ; Racecourse Wood, Thorpe, 30/10/42 ; Earlham Park, 6/11/42. Not infrequent among dead leaves.

882. *C. fragrans* (Sow.) Fr.—" Met with at almost every season of the year " (C.B.P., 1872) ; Salhouse, 1/12/1848 (R.W.) ; Mousehold, 12/10/1904 to 19/10/36 ; Stratton Strawless, 25/10/10/ and subsequently. Deighton Hills, Attlebridge, 3/10/15 ; Dunston Common, 27/10/16–19/10/36 ; Holt, 12/1927 (C. P. Petch) ; Row Heath, Beeston Regis, 28/9/32 ; Sheringham, 30/10/36 ; Easton, 5/11/37 ; Honingham Brecks, 5/11/37 ; Racecourse Wood, Thorpe, 14/11/39, etc. ; Smotton Common, 15/10/41 ; Drayton Brecks, 18/11/38, etc. ; Old Mill Marsh, Wheatfen Broad, 23/11/41 (E.A.E.) ; Weston, 14/11/41 (E.A.E.) ; Earlham Park, 6/11/42. We find this species more commonly on open heathy land or open park and wood. It has a somewhat ' Omphalia-like ' stem, distinguishing it from *C. suaveolens*, which grows in woods, but it is probably only a form of that species.

883. *C. angustissima* (Lasch.) Fr.—U. Tuck's Plantation, Wheatfen Broad, 24/10/35 ; Intwood, 24/10/42.

884. *C. obsoleta* (Batsch) Fr.—U. Wroxham Avenue, among conifers, 28/10/43 (G.J.C. and L.I.C.).

886. *Laccaria laccata* (Scop.) B. & Br.—Common (T. Woodward, c.1790) ; Salhouse, 16/10/49, (R.W.). " Exceedingly abundant " (C.B.P., 1872). We reiterate this remark of Plowright's. One of the most frequently occurring species in the county, especially common among old furze bushes and in open heathy woods everywhere. Felthorpe and Horsford Heaths, 11/10/1904 ; Ringland Hills, Mousehold, Drayton Drewray and Stratton Strawless, October, 1910. Holt, Dec., 1927 (C. P. Petch) ; Holt Lowes, 27/8/36 ; Newton St. Faith's Common, 14/10/37 ; Northrepps, Westwick, Stratton Strawless, Sprowston Wood, Wheatfen, Holt and Kelling Heath, 2–5/10/34 (B.M.S.).

var. *proxima* (Boud.) Maire—Drayton Drewray, October, 1910 and Brecks 21/12/34.

var. *amethystina* (Vaill.) B. & Br.—Salhouse, 23/10/48 (R.W.). " The amethyst-blue variety is by far the most uncommon " (C.B.P., 1872). Notwithstanding Plowright's remark, this is a very common form in many Norfolk woods. Broome (T. Woodward, 1790) ; Felthorpe, 11/10/1904 ; Horsford Heath, 12/10/06 ; Stratton Strawless and Drayton, 1910 ; Newton St. Faith's Common, 14/10/37 ; Cunnell's Pit, Eaton, 2/11/41 ; Northrepps, Stratton Strawless, Framingham

Chase, Holt and Swanton Novers, 2–5/10/34 (B.M.S.) ; Wheatfen Broad, various dates (E.A.E.). A specimen that appeared intermediate between the type form and var. *amethystina*, of a rich vinous purple colour, occurred at Framingham, 11/11/36.

891. *Hygrophorus eburneus* (Bull.) Fr.—Norfolk ,1848 (R.W.) ; Holt, 12/1927 (C. P. Petch) ; Ketteringham, 8/11/38.

892. *H. cossus* (Sow.) Fr.—Norf. List, 1884 (C.B.P.).

900. *H. glutinifer* Fr.—In undergrowth under oaks, Ketteringham, 18/10/38.

903. *H. discoideus* (Pers.) Fr.—Earlham Park, 20/12/34.

906. *H. limacinus* Fr.—Heacham Hall, 23/9/1896 (C.B.P.).

908. *H. olivaceo-albus* Fr.—Jex's Wood, North Wootton, 1872 (C.B.P.) ; Holt, 12/1927 (C. P. Petch) ; Ringland Wood, 18/11/32 and Drayton Woods, 12/10/40.

909. *H. hypothejus* Fr.—' Sir Wm. Jerningham's plantations at Cossey, nr. Norwich, October 1794 ' (Sow.) ; Swannington (K.T. 1872) ; ' Common ' (C.B.P. 1872) ; Horsford Heath, 8/11/1910 ; Drayton Drewray, 31/10/11 ; Framingham, 8/11/27 ; Mousehold, 3–15/11/32 (very abundant 24/12/34), 12/2/35, 11/11/35, 9/11/36 and subsequently ; Drayton Woods, 31/12/37, Drayton Brecks, 6/12/35, 7/11/36 ; Racecourse Wood, Thorpe 28/11/39, 18/11/42 ; Earlham Park, 6/11/42 ; Holt (C. P. Petch), December, 1927. A late season species, not uncommon.

915. *H. livido-albus* Fr.—Drayton Woods, 5/11/38 ; Bracon Ash (L.W.), 27/9/41.

916. *H. camarophyllus* (A. & S.) Fr. (—*H. caprinus* (Scop.) Fr.)—Sandringham, 25/10/1902 (C.B.P.) ; ' Near King's Lynn, 26/10/1902 ' (C. Rea) ; both records may relate to the same find (G.J.C.).

919. *H. pratensis* (Pers.) Fr.—C. ' Very common ' (C.B.P. 1872) ; Salhouse, 22/9/1848 (R.W.) ; Edgefield Heath, 1860 (K.T.) ; Holt, 12/1927 (C. P. Petch). Ringland Hills, 10/10/04, 5/10/10, 6/10/20 ; Mousehold, 10 and 11/10 ; Honingham Brecks 7/11/34 and 9/11/37 ; Gunton Park 12/10/20 ; Earlham Park, 10 to 20/12/34, 25/10/36, 6/11/36 and subsequently in November to 9/11/43. The var. *cinereus* Fr.—Wheatfen 22/9/33 (E.A.E.) ; var. *pallidus* B. & Br. —Earlham Park, 20/12/34 and 9/11/43.

921. *H. fœtens* Phill.—' Nottingham Point, King's Lynn, in short grass on old sea bank, 27/9/1896 ' (C.B.P.).

922. *H. virgineus* (Wulf.) Fr.—C. Salhouse, 9/10/1848 (R.W.) ; " Common " (C.B.P. 1872) ; " West Norfolk " (Mundford, in White's *Norfolk* 1864). Ringland Hills, 21/10/1909 ; Holt (C. P. Petch) December, 1927 ; Earlham Park, 27/10/34 to 20/12/34, 4/11/36 ; Honingham Brecks, 6/11/36 ; Smotton Common, Saxlingham, 15/10/41 ; Wheatfen (E.A.E.) 12/11/39. The var. *roseipes* Massee—Westwick woods, 30/10/35 ; Racecourse Wood, Thorpe, 28/11/39 ; Sheringham Woods, 21/10/36.

924. *H. niveus* (Scop.) Fr.—V.C. " Common " (C.B.P. 1872) ; Ringland Hills, 10/10/1904, 21/10/09 ; East Carleton, 18/11/14 ;

Weston, November, 1914 ; Westwick, 17/10/35 ; Honingham Brecks, 5/11/37 ; Ringland Heath, 9/11/37 ; Easton, 25/10/36, 5/11/37 ; Mousehold, 8/11/37 ; Racecourse Wood, Thorpe, 28/11/39 ; Earlham Park, 30/9/32, 20/12/34, 24/11/35 and subsequently in November each year to 9/11/43 ; Bawburgh Hangings, 25/10/36 ; Drayton Brecks, 7/11/36 ; Stratton Strawless, 17/9/41, 21/10/43 ; Postwick Grove, 24/10/41 ; East Bradenham, 17/10/43 ; Strumpshaw (E.A.E.), 10/10/43 ; Wheatfen, 20/11/41.

925. *H. russo-coriaceus* Berk. & Miller—Norfolk List 1884 (C.B.P.) ; Westwick Woods, 30/10/1935 (G.J.C.)

926. *H. fornicatus* Fr.—Norfolk List 1884 (C.B.P.).

931. *H. ovinus* (Bull.) Fr.—Massingham Heath, 29/10/1886 (C.B.P.).

933. *H. subradiatus* (Schum.) Fr., var. *lacmus* Fr.—Ashwicken, October, 1899(C.B.P.).

938. *H. lætus* (Pers.) Fr.—Massingham Heath, 29/10/1886 (C.B.P.).

940. *H. citrinus* Rea.—Hellesdon Golf Links, 9/10/1930 (G.J.C.).

941. *H. ceraceus* (Wulf.) Fr.—" Common " (C.B.P. 1872) ; Ringland Hills, 10/10/1904, 21/10/09, 5/10/10 and subsequently ; Postwick Grove, 22/10/09 ; East Carleton, October, 1914 ; Earlham Park, 7–21/12/34 and subsequently to 9/11/43 (very scarce in 1943) ; Honingham Brecks, 25/10 to 6/11/36, 9/11/37 ; Saxlingham Green, 9/11/38 ; Arminghall (Scotchman's Meadow), 16/11/40.

942. *H. coccineus* (Schæff.) Fr.—C. Salhouse, 28/9/1848 (R.W.) ; " Common " (C.B.P. 1872). Ringland Hills, 29/9/1904, 21/10/09 ; Postwick Grove, 22/10/09 and 24/10/41 ; East Carleton, 18/11/14 ; Taverham ; Dunston Common, 19/10/30 ; Mousehold, 20/10/30 and subsequently to 9/11/36 ; Racecourse Wood, 28/11/39–18/11/42 ; Earlham Park, 17/10/30, 20/12/34 and subsequently to 6/11/42 (not seen there 9/11/43) ; Honingham Brecks, 25/10/36 and 9/11/37 ; Hethersett Hall Park, 20/7/36 ; Wheatfen (E.A.E.) 1935.

This species is probably more common than nos. 924 and 941.

943. *H. miniatus* Fr.—N.I. Salhouse, 28/9/1848 (R.W.) ; " Frequent on damp heaths " (C.B.P. 1872). Stratton Strawless, 18/10/10 ; Keswick Park, 1/7/20 ; Mousehold, 13/10/30, 2/11/36, 25/11/39 ; Postwick Grove, 24/10/41 ; Holt (C. P. Petch) December, 1927 ; Strumpshaw Marsh (E.A.E.), 10/10/43) ; Wheatfen (E.A.E.), 7/10/37.

945. *H. turundus* Fr., var. *lepidus* Boud.—Surlingham Wood, Wheatfen, 5/10/1941 (E.A.E.).

946. *H. mucronellus* Fr.—" Near King's Lynn " (Cooke Illustr. No. 905, t.937, fig. b) ; Norfolk List 1884 (C.B.P.).

949. *H. puniceus* Fr.—N.I. Edgefield Heath, July, 1857 (K.T.) ; Ringland Hills, 29/9/1904 and subsequently ; Earlham Park, 7/12/33, 20/12/34 and 9/11/43.

950. *H. nigrescens* Quél.—Sprowston Wood, 5/10/1934 (B.M.S.).

952. *H. intermedius* Pass.—Holt, December, 1927 (C. P. Petch).

953. *H. conicus* (Scop.) Fr.—C. Norfolk c. 1848 (R. Ward fig. 80). " Everywhere " (C.B.P. 1872) ; Ringland Hills, 10/10/1904 ; Mousehold Heath, 31/10/10 and at the same spot, 7/11/27 ; Earlham Park, 9/24 ; Holt (C. P. Petch) 12/27 ; Beeston Regis, 22/9/32 ; Honingham Brecks, 6/11/36 and 5/11/37 ; Ringland Heath, 9/11/37 ; Racecourse Wood, Thorpe, 14/11/39 ; Cunnell's Pit, Eaton, 8/11/34 and 16/11/39 ; Eaton Golf Links, 30/9/39 and 18/9/43 ; Drayton Brecks, 9/11/35 ; Saxlingham Green, 2/9/41 ; Stratton Strawless, 5/10/34 (B.M.S.), 16/9/41, 14/10/43 ; Wheatfen, 5/7/41 (L.W.), 29/7/37, and 18/10/42 (E.A.E.). Although widely distributed, this species is found usually in lesser numbers than nos. 924 and 942 and earlier in the season.

954. *H. calyptræformis* Berk.—Norfolk List, 1884 (C.B.P.).

955. *H. chlorophanus* Fr.—F.C. Norfolk List, 1884 (C.B.P.) ; Norfolk and Norwich Hospital lawn, 4/8/1932 ; Earlham Park, 14/12/34, 24/11/35 and 4/11/36 ; Dunston Park, 15/10/36 ; Honingham Brecks, 6/11/36 ; Hethersett Park, 20/7/36 ; Sandringham Park, 28/7/37 ; Skeets Hill, Shotesham, 2/9/41 ; Yaxham (E. W. Clarke), 26/8/42 ; Stratton Strawless (B.M.S.), 4/10/34. A varicty, showing streaks of red coloration of both pileus and stem mixed with the usual citron yellow of the type form, occurred under hawthorns in a gravel and chalk quarry at Bawburgh, 26/7/36 and in an exactly similar habitat at Skeets Hill, Shotesham, 2/9/41 ; in the latter case the variety was growing mixed with the type form.

956. *H. psittacinus* (Schæff.) Fr.—Salhouse, c.1848 (R.W.) ; " Common " (C.B.P., 1872) ; Ringland Hills, 10/10/1904, 5/10/10 and subsequently ; Little Plumstead Park, 25/8/12 ; East Carleton, 16/10/13 ; Mousehold, 7/11/27 and 2/11/36 ; Earlham Park, 20/12/34, 26/11/40 and 6/11/42 ; Honingham Brecks, 25/10/36 and 9/11/37 ; Saxlingham Green 9/10/38 ; Racecourse Wood, Thorpe, 11/11/39 ; Drayton Brecks, 9/11/35 ; Holt (C. P. Petch), December, 1927. About equally frequent with the last species No. 955, but never seen in any great number at a time.

957. *H. spadiceus* (Scop.) Fr.—R. Buxton Heath, Hevingham, in boggy ground approaching moorland in character, 7/9/33 (E.A.E. and G.J.C.).

958. *H. unguinosus* Fr.—North Wootton, 1872 (C.B.P.).

961. *Clitopilus prunulus* (Scop.) Fr.—N.I. Salhouse, 18/9/1848 (R.W.) ; " Not common " (C.B.P. 1872) ; Strumpshaw, 17/9/1912 ; Eaton, 6/8/32 ; St. Faith's Common, 14/10/37 ; Sheringham, 30/10/36 ; Cringleford, 30/9/37 ; Smotton Common, Saxlingham, 28/8/41 ; Westwick, Stratton Strawless, Sprowston and Swanton Novers (B.M.S.), 2–5/10/34 ; Drayton (H.B.D.), 21/10/40 ; Carr's Hill, Costessey ; Wheatfen (E.A.E.), 7/10/37 and 24/8/41. As Plowright says, it is not really common, but we have seen this species latterly in a number of places where it was not recorded earlier, usually only one or two specimens at a time.

962. *C. mundulus* (Lasch.) Fr.—1884 List (C.B.P.) ; Honingham Brecks, 6/11/36 ; Brundall, 30/9/1943 (G. E. Deacon). The var. *nigrescens* (Lasch) Fr. was recorded from Ringstead, 1870 (C.B.P.)—see entry under No. 811.

963. *C. popinalis* Fr.—Sandringham, 25/10/1902 (C.B.P.) ; near King's Lynn, by roadside, 22/10/02 (C. Rea)—this may refer to the same gathering. Stevenson in '*British Fungi*' records this species from "Worthing," October, 1865 ; it is not certain whether this is the Worthing near East Dereham in Norfolk, but it might be presumed so as other records from that neighbourhood are given by Stevenson.

964. *C. undatus* Fr.—1884 List (C.B.P.).

966. *C. cretatus* B. & Br.—U. King's Lynn, October 1882 (Cooke Illustr. No. 345, t.375, fig. b) ; Norfolk List, 1884 (C.B.P.) ; Drayton Brecks, 8/8/1936 (G.J.C.) ; Harford Bridge, Keswick, 19/7/42 (E.A.E.).

973. *C. straminipes* Massee—R. Westwick woods, in short turf near beeches and birch scrub, a pretty little group, 9/10/1933 ; it is much like an *Eccilia* (G.J.C.).

980. *Flammula decipiens* W.G.Sm.—At roots of burnt furze on Ringland Hills, 8/9/1934 and 8/11/34.

—. *F. lenta* (Pers.) Fr. (—*Hebeloma glutinosum* (Lindgr.) Fr.) Norfolk List 1884 (C.B.P.). For other records see No. 759, Trans. Norf. & Norw. Nat. Soc. xv., 225.

983. *F. lupina* Fr.—Hockham Mere, on fen soil and pasture, 3/11/1935 (E.A.E.).

985. *F. juncina* W.G.Sm.—North Wootton, November, 1870 (Cooke Illustr. No. 472, t.475) ; Norfolk List 1889 (C.B.P.) "on dead bulrushes in an old clay pit."

986. *F. gummosa* (Lasch.) Fr.—Westwick, 3/10/1934 (B.M.S.) Eaton, on a buried stump, 5/11/43.

989. *F. carbonaria* Fr.—C. Bawsey, September, 1872 (C.B.P.) ; Felthorpe, 5/11/1919, 8/10/20 ; Mousehold, October, 1912, 14/10/21, 21/10/24, 23/11/31, 8/11/41 ; Ringland, 12/9/34 ; Sprowston Wood (B.M.S.), 5/10/34 ; Earlham Park, 4/11/36 ; Honingham Brecks, 25/10/36 ; Marston's Lane, Eaton (S.A.M.), 8/4/36 ; Ketteringham, 18/10/38 ; Blue Bell Hole, Eaton, 19/10/40 ; Drayton, 29/11/41. Usually found where gorse has been burnt.

991. *F. fusus* (Batsch.) Fr.—East Carleton, 20/6/1912 ; Stratton Strawless, 27/8/14 and (B.M.S.), 4/10/34 ; "Worthing" (Stevenson : *Brit. Fungi*, 1886)—it is not stated whether this is the Norfolk village, but many records given by Stevenson are from the East Dereham district, probably supplied by Du Port.

994. *F. alnicola* Fr.—Norfolk List, 1884 (C.B.P.) ; on alder, Hockham Mere, 3/11/1935 and Wheatfen, 28/10/35 (E.A.E.).

995. *F. flavida* (Schæff.) Fr.—U. Holt, 9/10/1896 (C.B.P.) ; Framingham, under laurels, probably on buried wood, 4/11/32 ; Smotton Common, Saxlingham, 28/4/41.

996. *F. inaurata* W.G.Sm.—North Wootton, on willow, November, 1870 (Cooke Illustr. No. 482, t. 477) ; Norfolk List, 1889 (C.B.P.) This is probably a small form of 994.

997. *F. conissans* Fr.—" Reffley and elsewhere on osier stumps " (C.B.P. 1872) ; Framingham, on a dead stump, 3/11/32.

998. *F. inopus* Fr.—Norfolk List, 1884 (C.B.P.).

999. *F. apicrea* Fr.—Haveringland, 8/11/16 ; Westwick, 3/10/35 ; Buxton Heath, Hevingham, 26/8/36 ; Felbrigg Great Wood, 24/9/38.

1003. *F. hybrida* Fr.—Holt, 9/10/1896 (C.B.P.) ; Westwick, 26/10/1935 (the latter specimens agreed more with descriptions of *F. penetrans* Fr., but I believe them to be forms of the same species—G.J.C.)

1004. *F. sapinea* Fr.—V.C. Norfolk List, 1884 (C.B.P.). Usually on pine stumps, but also on pine needles and fragments of the rotten wood ; commonly in a small form and less frequently in a larger and more richly coloured form ; September to December ; once in May (Hethersett Hall, 7/5/37) and once in June (Bawsey, 7/6/30, B.M.S.). Norfolk localities include Attlebridge, Bluestone Wood at Heydon, Drayton Woods, Felbrigg Great Wood, Holt (C. P. Petch), Horsford, Northrepps Wood, Sheringham, Smotton Common, Sprowston, Stody Wood, Stratton Strawless, Swanton Novers, Thorpe Wood, West Runton, Westwick, Wheatfen Broad, and in many other woods not listed here.

1005. *F. liquoritiæ* (Pers.) Fr.—" Mattishall, October, 1883, on fir " (Stevenson, *Brit. Fungi*) ; Norfolk List, 1884 (C.B.P.).

1006*. *F. limulata* Fr.—Ringland, 10/11/1934 (coll. G.J.C., det. A.A.P.).

1007. *F. tricholoma* (A. & S.) Fr.—Norfolk, 1883 (Cooke Illustr. No. 444, t. 404, as *Inocybe tricholoma*) ; Norfolk List, 1884 (C.B.P.) ; Sprowston and Framingham Chase, 5/10/34 (B.M.S.) ; Felbrigg Great Wood, 12/10/38.

1010. *F. scamba* Fr.—Sprowston woods, 5/10/34 (B.M.S.).

1011. *F. ochrochlora* Fr.—U. " King's Lynn, on a railway sleeper, 26/11/1886 " (C.B.P.) ; Saxlingham Green, 2/9/41.

——. *F. flava* (Bres. (—*Naucoria flava* Bres.—*Flammula dactylidicola* Lange).—This species was found growing, as is its habit according to Lange, on rhizomes of cock's-foot grass (*Dactylis glomerata*) in the garden of Old Lakenham Hall, Norwich, 29/8/1942, by E.A.E. and G.J.C. and determined by A.A.P. It has not hitherto been recorded from Britain and Mr. A. A. Pearson (in litt. 3/10/42), says that " so far as our information goes it has only been recorded by Bresadola, presumably in Italy and by Lange in Denmark."

1013. *Gomphideus glutinosus* (Schæff.) Fr.—" Pine groves at Earsham, Broome and Kirby Cane " (T. Woodward, c. 1790, quoted by Withering) ; East Norfolk (Mundford, 1864) ; " Very common " (C.B.P. 1872) ; Attlebridge ; Honingham ; Saxlingham, 2/9/41 ; Tuckswood, Lakenahm (L.W.), 11/10/41.

1014. *G. roseus* (Fr.) Quél.—R. North Wootton Heath, 1872 (C.B.P.). ; Newton St. Faith's Common, amongst conifers in a boggy place, 14/10/37 and 20/8/42.

1015. *G. viscidus* (L.) Fr.—C. Salhouse, 18/9/1848 (R.W.) ; " Common " (C.B.P., 1872) ; Felthorpe, 3/10/11 ; East Carleton, 16/10/33 and 27/10/14 ; Horsford, 26/8/14 ; Sheringham, 2/9/19 ; Raveningham, 20/9/20 ; Holt (C. P. Petch) December, 1927 and (G.J.C.) 27/8/36 ; Northrepps and Sprowston (B.M.S.) October, 1934 ; Plumstead, 7/11/34 ; Stoke Holy Cross, 25/10/35 ; Newton St. Faith's, 14/10/37, etc. ; Drayton Woods and Drayton Drewray, 18/11/38, etc. ; Saxlingham Green, 2/9/41 ; Buxton Heath, Hevingham, 26/8/36 ; Racecourse Wood, Thorpe, various dates ; Yaxham (E. W. Clarke), 26/8/42.

1017. *G. gracilis* B. & Br.—Norfolk List, 1884 (C.B.P.).

1018. *Collybia radicata* (Relh.) Berk.—Salhouse, 19/8/1850 (R.W.) ; " Anything but common in the neighbourhood of Lynn, neither does it appear to have occurred elsewhere in the county " (C.B.P. 1872). It is difficult to explain the above remark of Plowright, seeing the present day frequency of the species in East Norfolk, especially around beech stumps (G.J.C.). A pure white specimen was found on Wootton Marshes, October 1869 (C.B.P.) ; Woodlands Park, N. Heigham, 21/9/1904 ; Stratton Strawless, 26/9/04, 12/9/11 and (B.M.S.) October, 1934 ; Colney, 12/12/11 to 22/11/35 ; Costessey Woods, 22/8/16 and annually ; Drayton, 22/8/16 ; Westwick, Sprowston and Framingham Chase (B.M.S.), 2–5/10/34 ; Great Melton and Marlingford, 9/10/35 ; Holt, 27/8/36 ; Earlham Park (under oaks 25/10/38), 4/11/36 to 9/11/43 ; Bluestone Wood, 2/10/37 ; Easton, 5/11/37 ; Felbrigg Great Wood, 24/9/38 ; Ketteringham, on an oak stump, 18/10/38 ; Swanton Novers, 22/10/40 ; Old Lakenham Hall, 29/8/42 ; Dunston, 19/10/43 ; Little Plumstead, 2/11/43 ; Mangreen (L.W.) 28/8/41 ; Litcham Common (E. W. Clarke), 26/8/41 ; Wheatfen (E.A.E.), 29/10/39 ; Eaton, 3/11/39 and 5/12/41. A variety with dark-edged gills was found at Earlham Park, 9/11/43.

1021. *C. longipes* (Bull.) Berk.—Norfolk List, 1884 (C.B.P.) ; Yaxham, in a pasture, 26/8/42 (E. W. Clarke).

1023. *C. platyphylla* (Pers.) Fr.—Norfolk List, 1884 (C.B.P.) ; Holt, December, 1927 (C. P. Petch) ; Holt House Wood, Bawsey, 7/6/30, Northrepps, West Runton and Westwick, 2–3/10/34 (B.M.S.) ; Felthorpe, 24/10/19 ; Felbrigg, 4/9/38 and 24/9/38 ; Drayton 12/10/40.

1024. *C. fumosa* (Pers.) Quél.—Bawsey, 12/11/1898 and Castle Rising Heath, 18/11/98 (C.B.P.). Plowright (1872) recorded a " var. *polius* " as found on the roadside at Rising. I do not know to what species this record refers unless it be No. 812, *Clitocybe polia* Fr.

1026. *C. semitalis* Fr.—Norfolk List 1884 (C.B.P.).

1027. *C. fusipes* (Bull.) Berk.—N.I. " This species, so common elsewhere, I have only found twice " (C.B.P., 1872). Costessey Park, on beech, 18/7/1912 ; Blofield, on oak, 1/8/12 ; East Carleton, 1/11/16 ;

Arminghall, on oak, 13/10/19 ; Marlingford, on beech, 23/7/33 and 9/8/34 ; Dunston Park (S.A.M.), 1/8/36 ; Blickling Park, 11/7/40 ; Eaton, near limes and oaks, 18/8/40 ; Stratton Strawless, 25/9/41 ; Racecourse Wood, Thorpe, 30/10/42 ; Earlham Park, 11/11/42.

1029. *C. maculata* (A. & S.) Fr.—C. Pine grove, Kirby Cane (T. Woodward, c. 1790) ; " Not very rare in woods in Norfolk, on Mousehold Heath and other places " (Sowerby) ; " Abundant on heaths " (C.B.P. 1872). Mostly found on bracken-covered heathland and in open birch woods, from September to December and once in June (Sheringham 17/6/36). Norfolk localities include : Drayton Brecks, Drayton Drewray, Easton, Felbrigg, Holt, Horsford Heath, Ketteringham, Northrepps, Sheringham, Sprowston, Stratton Strawless, Swanton Novers, Thorpe (Racecourse Wood), Weasenham Wood (E. W. Clarke), West Runton, Westwick and Wheatfen Broad. The var. *immaculata* Cooke has been found at Drayton Drewray, 3/11/28, Drayton Woods, 5/11/38 and Racecourse Wood, Thorpe, 30/10/42.

1030. *C. fodiens* Kalchbr.—Norfolk List, 1884 (C.B.P.).

1032. *C. distorta* Fr.—U. Norfolk List, 1884 (C.B.P.) ; Westwick, 4/10/33 (G.J.C.) and 3/10/34 (B.M.S.) ; Stratton Strawless, 21/9/41 ; Racecourse Wood, Thorpe, 9/10/43.

1033. *C. butyracea* (Bull.) Fr.—V.C. " Very common " (C.B.P., 1872). This species occurs most abundantly in some woods and appears to be on the increase in some areas. Found from September to December and once in Janaury (Dunston woods, 7/1/43), often late in season as at Stratton Strawless in 1941 where it was scarce on 3rd October and plentiful on 11th December. Norfolk localities include :—Blakeney Downs (pasture), Burntfen, Hoveton, Colney Park (pasture), Drayton woods and Drayton Drewray, Dunston woods, Earlham Park, Eaton (Blue Bell Hole), Felbrigg Great Wood, Framingham, Honingham (pasture), Keswick, Mousehold, Northrepps Wood (L.W.), North Walsham Wood, Thorpe (Racecourse Wood), Sheringham, Smotton Common, Stratton Strawless (5/10/10 and annually since), Swanton Novers, Weasenham Wood (E. W. Clarke), Westwick and Wheatfen Broad.

1037. *C. velutipes* (Curt.) Fr.—C. " Everywhere " (C.B.P. 1872) ; Brandon, 8/11/76 (C.B.P.) ; Horsford Heath, 7/12/1910 ; Woodlands Park, N. Heigham, 13/12/10 ; Holt (C. P. Petch), December, 1927 ; Wheatfen Broad, October to January and once in April (2/4/36) ; Whitlingham (on elm), 13/6/42 (R. M. S. Brown) ; Lower Hellesdon (H.B.D.), 21/4/40 ; Great Melton, on elm, 12/1/39 ; Blakeney Downs, on furze, 23/10/40 ; Mousehold, on furze, various dates in November and December ; Smotton Common, 23/11/41 ; Eaton, on elm, January —February, 1941 ; on elm and elder, Lakenham, 26/1/41 ; Distillery Street, Norwich, 7/12/43 ; Black Peter's Grove, Earlham, on elm, 7/1/44. Common as a winter species on furze, less so on elm and elder, sometimes lasting until April.

1041. *C. leucomyosotis* Cooke & Smith (—*C. palustris—Tephrophana palustris* (Peck) Faure).—U. Bawsey, 7/6/1930 and Leziate Fen, 9/6/30 (B.M.S.) ; Newton St. Faith's Common, 3/6/33 and 20/8/43.

1042. *C. cirrhata* (Schum.) Fr.—F.C. Stratton Strawless, 26/9/1904 to 21/10/43 ; Westwick, various dates ; Eaton, 6/11/36 ; Wheatfen, 18/10/42 ; Northrepps and Stratton Strawless, 2–4/10/34 (B.M.S.).

1043. *C. tuberosa* (Bull.) Fr.—N.I. "Commonly growing on dead and black *Lactarii ;* frequent." (C.B.P. 1872). We find it mostly on old *Russula nigricans.* Stratton Strawless, 12/11/42 and 19/10/43 ; Lamb's Holes, Newton St. Faith's, 29/11/37 ; Westwick, 8/10/36 ; Felbrigg Great Wood, 24/9/38 ; Wheatfen (E.A.E.), 1/11/39, 24/8/41, etc. ; West Runton, Westwick, Stratton Strawless and Sprowston, 2–5/10/34 (B.M.S.).

1050. *C. xanthopus* Fr.—Norfolk List 1884 (C.B.P.).

1051. *C. nitellina* Fr.—South Wootton 1889 (C.B.P.).

1055. *C. acervata* Fr.— Colney Park, 9/10/1935 ; Stratton Strawless, 17/9/41 ; Thorpe Woods, 9/10/43.

1056. *C. extuberans* (Batt.) Fr.—Neatishead 1881 (M. C. Cooke—Cke. Illustr. no. 202, t. 146) as *C. nitellinus.*

1061. *C. rancida* Fr.—U. Ashwicken, 28/9/1897 (C.B.P.) ; Racecourse Wood, Thorpe, 14 and 28/11/39 and 18/11/42 ; Mousehold, 13/12/39.

1063. *C. coracina* Fr.—U. Drayton Brecks, 17/12/1934 (coll. G.J.C., det. C. Rea).

1068. *C. atrata* Fr.—Bawsey and Ringstead (C.B.P. 1872) ; Beeston Regis, 21/9/1932 ; Stratton Strawless (B.M.S.), 4/10/34 ; Earlham Park, 3/11/35 (coll. G.J.C., det. A.A.P.).

1069. *C. ambusta* Fr.—F.C. Earlham Park, 8/12/1936 and 25/11 to 13/12/39 ; Honingham, 9/11/37 ; Ketteringham, 18/10/38 ; Eaton, 18/10/40 ; Drayton, 29/11/41 ; Mousehold, various dates.

1072. *C. protracta* Fr.—U. Horsford Heath, 24/10/1919 ; Mousehold Heath, 27/11/33 ; Northrepps Hall wood (B.M.S.), 2/10/34.

1074. *C. clusilis* Fr.—Lime Tree Road, Eaton, Norwich, on bare soil under conifers, 4/12/1940.

—. *C. pseudo-clusilis* Josserand & Konrad—R. Drayton Brecks, 1–29/12/1934, late November 1935 to early January 1936 ; 31/12/37 and annually since ; Dunston churchyard, on a lichen-covered recumbent tombstone, 15/10/37 ; Easton, on barren gravelly ground mostly covered with the lichen *Peltigera canina*, 9 to 18/11/37 and 25/10/38 ; Weston, in pasture (E.A.E.), 14/11/41. This species was first recorded in Britain from Broadwater Forest, Sussex at the end of November 1933, by A. A. Pearson and I am not aware of any other records for it in this country. It is a late autumn species favouring exposed localities and associated generally with conifers.

ADDITIONS TO PARTS I—IV.

——. *Pluteus godeyi* Gillet—Wheatfen Broad, 1/10/1942 (coll. E.A.E., det. A. A. Pearson) : the first record of this species in Britain.

145. *Lepiota castanea* Quél.—Pretty Corner, Sheringham, 22/10/37.

148. *Lepiota naucina* Fr.—Eaton, under *Thuja lobbii* in a garden, 12/9/41 and 2/9/42 (coll. L. Moll.) ; Bradeston, October, 1943 (coll. E.A.E.) ; the var. *leucothites* (Vitt.) Fr. was found at Bradeston (E.A.E.) 2/11/43.

233. *Amanita muscaria* var. *regalis* Fr.—Stratton Strawless, 17/9/41.

339. *Cortinarius* (*Phleg.*) *cyanopus* (Secr.) Fr.—Ketteringham (coll. L. Moll), 7/7/41 ; Stratton Strawless, 17/9/41, 21/9/43, 14/10/43.

411. *C.* (*Ino.*) *tophaceus* Fr.—King's Lynn (Stevenson, *Brit. Fungi*).

415. *C.* (*Ino.*) *bolaris* (Pers.) Fr.—Two widely separated colonies at Stratton Strawless, 17/9/41 and 25/9/41.

441. *C.* (*Dermo.*) *uliginosus* Berk.—Ketteringham (coll. L. Moll), 7/9/41.

461. *C.* (*Tela.*) *scutulatus* Fr.—Foxley (Stevenson, *Brit. Fungi*).

518. *C.* (*Hydro.*) *pateriformis* Fr.—Stratton Strawless, 25/9/41.

——. *Astrosporina napipes* Lange.—Stratton Strawless, 17/9/41 (det. A. A. Pearson).

617. *Tricholoma spermaticum* (Paul.) Fr.—Smotton Common, Saxlingham (coll. L. Moll), 21/9/41 ; Thorpe woods, 9/10/43.

625. *T. pessundatum* Fr. (—*populinum* Lange)—Mousehold Valley Drive, October and November 1943 (E.A.E. and G.J.C.).

633. *T. truncatum* (Schæff.) Quél.—*geminum* (Paul.) Fr.—Eaton, under hedgerow oaks, October, 1943 ; Bradeston (E.A.E.), 16/10/43. I believe that I saw this species several times many years ago, notably at Sprowston Wood.

654. *T. cartilagineum* Fr. non Bull.—Stratton Strawless, 17/9/41.

XI

FLORA AND FAUNA OF NORFOLK

MISCELLANEOUS OBSERVATIONS

Compiled by E. A. Ellis

Phenological Notes—The winter of 1943—44 was unusually mild and plants in woods and sheltered hedge-bottoms made considerable vegetative growth which was checked later; for instance, many shoots of cuckoo-pint were showing above ground at Brundall on January 6th, almost two months before their usual time. Spring flowering dates for most plants came about a fortnight later than in 1943; for example, the first hawthorn blossom on Norwich Castle mound opened on April 28th as against April 15th in 1943. The following "first appearances" were noted in April:—great stitchwort, 7th; evergreen alkanet, 8th; germander speedwell, 14th; red campion, 15th; cuckoo-pint, 19th; bog stitchwort, 23rd (the foregoing all at Brundall); wall ragwort (*Senecio squalidus*) at Norwich, 15th; garlic-mustard at Keswick, 16th; wild chervil (*Anthriscus scandix*) at Norwich, 19th and bulbous buttercup at Norwich, 25th.

Plant Records—The Peruvian weed, *Galinsoga parviflora* Cav., reported last year from Gt. Yarmouth, appeared at Narborough in the west of the county during August—September, 1944 (H. A. Birkbeck). Elecampane (*Inula helenium* L.) was found (three plants) beside a small stream at Wendling (A. H. Turner). An alien crucifer, *Sisymbrium orientale* L. flourished on some bombed sites in Norwich, 8/5/44. The water-starwort *Callitriche obtusangula* Le Gall. was found growing in a drain running through the garden at Wheatfen, 6/7/44. English catchfly (*Silene anglica* L.) was flowering on waste ground by the River Wensum, off Oak Street, Norwich, in June, 1944 and its variety *quinquevulnera* (L.) was collected by Q. E. Gurney at Bawdeswell about the same time. The night-flowering catchfly appeared commonly as a field weed, amongst barley, at Bradeston this year. Yellow figwort, *Scrophularia vernalis* L., though known to have become established in Norfolk for at least 120 years, is still a very rare plant here; a hitherto unrecorded colony was found in flower on rough ground at Eccles, near East Harling, in May, 1944 (per Miss P. Meade). No less than six plants of the hybrid groundsel-ragwort, *Senecio squalidus* x *vulgaris*, were found on bombed sites in Norwich during May, 1944, as the result of widespread searching amongst many thousands of the parent plants. Species of particular interest seen in West Norfolk in 1944 (R. P. Libbey) were:—Spanish catchfly, *Silene otites* Wibel at Gayton; purple milk vetch, *Astragalus danicus* Retz. still persisting at West Harling Heath; swine's

succory, *Arnoseris minima* S. & K., a rare weed of cultivation, at Pentney; smooth cat's-ear, *Hypochæris glabra* L., at Drayton; dune centaury (*Centaurium pulchellum* Dr.) at Holme-next-the-sea; a hybrid dock (*Rumex conglomeratus* Murr. x *maritimus* L.) at South Wootton and the club rush, *Heleocharis uniglumis* Sch. at Derby Fen, Grimston.

Virus-Free Wild Black Currant—Numerous wild currants—black, red and white—grow freely in many of the waterside thickets or carrs of East Norfolk. There they suffer from most of the pests and diseases known to attack their cultivated brethren and it might be thought by ardent horticulturists that they should be eliminated as centres of infestation. As a matter of fact, they are not, in the aggregate, anything like so numerous as the neglected bushes in private gardens. Having to fend for themselves under natural conditions, competing for living-space and subject to the attacks of parasitic fungi and insects, only the hardiest of these wild stocks can survive and bear fruit; for this reason they should be looked to as a source from which stocks showing resistance to diseases of one kind or another might be obtained. Perhaps the most troublesome disease of cultivated black currants is that caused by "reversion" virus, commonly following infestation by "big bud" mites. This trouble is so universal that it is extremely rare to find a wild bush unaffected; it is therefore worth recording that in June, 1944, I came upon a fine black currant, probably about seven years old, with a good hang of fruit and free from all symptoms of "reversion," growing wild in the closed reed swamp at Surlingham Broad.

E. A. E.

Alien Weeds in Norfolk—The introduction and spread of plants alien to this country is often a matter of considerable interest and conjecture. The dissemination may start from one locality where a plant was first introduced and gradually extend over wider areas, or simultaneous introduction may take place at a number of different centres, thereby giving the plant a relatively wide distribution at once. A striking example of the latter method was seen in the summer of 1944, when several alien species, though recorded previously from this county from time to time, were reintroduced on a larger scale. From many different parts of Norfolk alien plants were reported or seen growing in fields of carrots, their seeds having been brought to this country as impurities in agricultural seeds sown on the land.

By far the most abundant and widely distributed of these plants was the Green Bristle-grass or Green Panic, *Setaria viridis* (L.) Beauv., a native of Central Europe and Asia; it was seen in carrot fields at Massingham, Sprowston, Cockley Cley, Ickburgh, Marham, Narborough and Sporle, and reported from several other localities. The Cockspur Panic or Barn-yard Grass, *Panicum*

crus-galli L., with its purple spreading inflorescence, was also widely distributed but never so numerous as the Green Panic. Other less frequent species seen were :—*Panicum capillare* L. var. *occidentale* Rydb. (Witch Grass), a native of North America ; *Setaria glauca* Beauv., seen at Ickburgh only ; *Amaranthus retroflexus* L. ; *Kochia scoparia* (L.) Schrad. ; *Salsola kali* L. var. *tragus* L. *Solanum* sp.

In one field of carrots near Sprowston, large colonies of an alien dodder were seen attacking not only the carrots but also other weeds in the field, namely Ribwort Plantain, Creeping Thistle and a species of bent grass (*Agrostis* sp.). The Director of the Royal Botanic Gardens, Kew, to whom typical samples were sent, identified the dodder as *Cuscuta pentagona* Engelm., which is parasitic upon a wide variety of plants in America. When seen during October it was flowering and fruiting abundantly and it remains to be seen whether the seed will prove viable and if so, whether it will persist and attack future crops grown in the area. The writer would be interested to hear of any other records of alien weeds in carrots or to receive any fresh or dried material of these next summer.

R. P. Libbey.

Marsh Sowthistle in East Norfolk and Lothingland—*Sonchus palustris* L., the great sowthistle which overtops the reeds beside the rivers of East Norfolk has long been looked upon as a " very, rare " and decreasing species in Britain. Arthur Bennett in 1905 (*Trans. Norf. & Norw. Nat. Soc.* viii, 35—40) noted that it had become extinct by then in the marshes of Cambridgeshire, Huntingdon, Lincoln, Middlesex and West Norfolk, but was still to be found, though rarely, in Kent, East Norfolk and Suffolk and perhaps Essex. Bennett (1905) and Nicholson (*Flora of Norfolk*, 1914) quoted many records of it in East Anglia, mainly dating from 1866 or earlier, and gave the impression that the plant had been seen much more rarely here in recent years. Its subsequent re-discovery in parts of the Waveney, Yare, Thurne and Bure valleys, reported from time to time by P. E. Rumbelow, R. Gurney and myself, taken together with observations made in 1944, brings me to the belief that *Sonchus palustris* is probably about as frequent in the area now as it was 220 years ago, when Sherard first recorded it from Lothingland. It is essentially a plant of reed *ronds fringing the lower reaches of rivers and its preservation is due to the fact that there are still many such strips of rond left between the marsh walls and the rivers ; any embankment scheme which substituted sheet piling and the building of walls right at the water's edge would at once alter the character

* " Rond " in the East Anglian dialect refers to a strip of marshy land situated between a high-level river, estuary or broad and an artificial bank or wall built to prevent water in the high-level system from flooding the low-level land behind it.

of the vegetation and result in the disappearance of *Sonchus palustris* among other things. It is to be hoped that no drainage authority will carry out " work " of a sweeping character on these lines ; the ordinary upkeep of walls behind the ronds is not likely to have any adverse effect,. The biological interest of the ronds is so great that in any preservation plan for the Broads, measures should be taken to safeguard them from interference. In the following paragraphs the status of *Sonchus palustris* in the river valleys of East Norfolk and Lothingland is given as recorded up to 1944.

River Waveney :—1724, Lothingland (Sherard) ; 1805, riverside at Beccles and Worlingham (Crabbe) and ditches under Burgh Castle (Wigg) ; 1830, banks of the Waveney between Beccles and Yarmouth (Woodward) ; 1834—1850, Burgh Castle (Paget, Priest, Blake) ; 1857, marshes opposite Burgh Castle (Butler) ; 1862, Belton and St. Olave's (Phytologist 1862) ; 1877, sought in vain at Burgh Castle (Blake) ; 1898—1902, Burgh St. Peter (Baker and Dutt) ; c. 1913—1944, St. Olave's and Haddiscoe (Rumbelow) ; 1938, opposite Burgh Castle (Ellis) ; 1944, Burgh St. Peter, Somerleyton, Wheatacre, Haddiscoe, St. Olave's, extensive colonies on all suitable reed ronds by the river (Ellis).

River Yare :—Before 1866, Strumpshaw, Hardley, Cantley (Trimmer) and Reedham (Leathes) ; 1935, Rockland Broad, Strumpshaw and Surlingham (Ellis and Geldart) ; 1939, river bank, Wheatfen (Ellis) ; 1944, Brundall, Strumpshaw, Wheatfen, Buckenham Ferry (large colony) and on all suitable ronds, chiefly on the north shore of the river, down to Limpenhoe.

River Bure :—1866, Acle (Trimmer) ; 1930, Acle and Stokesby, thousands of plants (Ellis and Patterson) ; 1944, still at Acle.

River Ant :—1935, Ludham (Ellis).

River Thurne :—1873, West and East Somerton (Trimmer) ; 1893, Hickling (Bird) ; 1923, Brayden marshes, near Horsey Mere (J. Vincent and R. Gurney) ; 1938, Horsey, survived sea flood and extending its range 1944. (A. Buxton).
Flegg Broads :—1876, Rollesby (Trimmer).

The corn sowthistle (*Sonchus arvensis* L.) is not uncommon along the banks of Norfolk rivers and is present in most localities frequented by *S. palustris* ; when in flower together, there is no excuse for confusion, since the florets of the former grow in much larger and more richly yellow heads. I have never seen intermediates, though *S. arvensis*, like its relatives *S. oleraceus* and *S. asper*, shows much variation. In both *S. palustris* and riverside *S. arvensis*, large numbers of flowers fail to produce fruits. The fertile fruits of *S. palustris* change from white to pale brown in ripening, as do those of some samples of *S. asper* growing in wet places ; those of *S. oleraceus*, some *S. asper* and *S. arvensis* go through a rich yellow stage as they ripen. (E.A.E.)

"Bermuda Grass"

A Grass New to Norfolk—On 6th August, 1944, I found a colony of the very rare " Bermuda Grass," *Cynodon dactylon* (L.) Pers., growing by the roadside at Castle Rising. Measuring eighteen by three feet, with many young plants at the edges, the colony must have been three or four years old and slowly spreading. Mr. Hubbard informs me that it is almost the last British grass which might be expected to occur in Norfolk and that there is no specimen of it from this county in either Druce's herbarium or at Kew ; no local record of it appears in Druce's *Comital Flora*. Of rare occurrence on our south-west coasts, this grass is common only in southern and central Europe and has become naturalised in America. It is a far from hardy species and is liable to destruction by frost. Fortunately, its Norfolk station is near the coast, so that it is less likely to suffer from extreme cold than in an inland locality. At Castle Rising the grass grows on relatively high ground and on extremely porous soil which is never likely to become waterlogged ; for this reason also its maintenance and increase may be confidently expected.

E. L. Swann.

Non-Floral Nectaries—A casual observation may open up a new field of interest in the most unexpected way. Thus, on the morning of May 9th, 1944, I happened to look out of my window at Brundall to see a cock chaffinch busy pecking at red deadnettles in the front garden ; going out to investigate more closely just what he was doing, I got on the track of much interesting information at first hand concerning nectaries on plant organs other than flowers. First, it turned out that the chaffinch had been taking the deadnettle seeds while they were still green (though shaking out easily). Some of these " nutlets " had been scattered and were now being carried away by common dark brown ants, *Lasius niger* (L.) ; the seeds had shining basal excrescences which the ants seized in their jaws and one was led to suspect that they might not be merely stealing the seeds for complete destruction, but that the " glands " alone might have a passing interest while the seeds might eventually be left in the soil to germinate. Further, the ants were climbing the deadnettles and imbibing nectar from special glands on the stipules, to which they appeared to be guided by dark purplish marks outlining the stipules and in some cases running down the stem-ridges for two inches or more. In sunshine, the tissues under the leaf-bases appeared stretched and semi-transparent, sparkling like aerated water, and the ants were taking what they wanted at or on the borders of the ultimate dark areas and again from purple spots on the calices. Some plants of white deadnettle were next inspected on a neighbouring hedgebank and these, too, had rather similar honey-guides attracting ants in great numbers ; the distribution of dark blotches was slightly different and there were no dark lines running down the stem ridges. Broad bean plants in the garden and all kinds of wild

vetches in the neighbourhood were found to have more or less conspicuous dark purple spots on stipules and calices, with nectaries for the ants.

Soon afterwards, I noticed many honey bees " working " a laurel hedge and it turned out that they were getting nectar from inconspicuous little glands on the undersides of the leaves, in the axils of the veins. In another garden, ants were tapping the leaves of other laurels, with similar purpose. The common laurel being a *Prunus* (*P. laurocerasus*), I looked out for leaf-nectaries on other members of its family and was not disappointed. Leaf-stalks of cherry had bright red glistening knobs from which crowds of ants were collecting sweetness ; peach and almond had nectaries of much the same design. Looking round for other examples, I found that the wayfaring tree (*Viburnum lantana*) and wild guelder rose (*V. opulus*) also possessed leaf-nectaries, but saw no insects visiting them. There should be plenty of scope for further observation on these lines ; perhaps some other members of this society will keep a look-out for leaf—and stipule—nectaries in the coming year and note the behaviour of their insect guests. (E.A.E.)

Sea Aster at Horsey—At the end of September, 1944, I found sea aster (*Aster tripolium*) in flower on a marsh about half a mile from the sea near the Hundred Stream. I had never seen this species in flower on one of my marshes before, except just after the sea flood of 1938. I subsequently discovered that there were a few small areas at this spot where the surface quaked as I trod on it, giving the impression of walking on a pie-crust over a very liquid pie. At the end of November I took out with a spade the top spit from one of these places, when the water welled up. I inserted and filled a bottle and sampled it. The result was 10.35 per thousand chloride, i.e. one-third as salt as the sea. This is a remarkably high salinity, particularly as the marshes were sodden with rain at the time. I conclude that the salt-water table at this spot is very near the surface, and that I tapped the sea itself, diluted with surface water. About three years ago an enemy plane dropped some bombs in this place, which apparently exploded deep underground, and these were probably responsible for the quaking areas. (A. Buxton).

Norfolk Rust Fungi—*Puccinia betonicæ* (A. & S.) DC. was found on wood betony growing at the edge of a marsh between Surlingham Ferry and Brundall Gardens, 30/4/44 (new to the county). Aecia of *P. chærophylli* Purt. were plentiful on wild chervil (*Anthriscus sylvestris*) at Strumpshaw in April ; uredo-spores of *P. porri* (Sow.) Wint. were found by Mr. T. Petch on leeks at North Wootton in December. *Uromyces genistæ-tinctoriæ* (Pers.) Wint. was collected on dyer's green-weed (*Genista tinctoria*) near Wymondham by Dr. P. R. Buckton and at Wacton Common (D. H. Smith)

in September, 1944. *U. armeriæ* (Schlecht.) Lév. showed abundant pycnia and æcia on thrift in a garden at Lingwood on April 12th. (E.A.E.)

NORFOLK MYCETOZOA : recent additions to the county list.

Physarum nutans Pers. var. *robustum* Lister*—On living grasses, Costessey, August, 1930, collected by R. Gaze. While the typical form is extremely common in all localities, this variety has not been recorded previously from Norfolk.

Physarum crateriforme Petch*—A very small gathering from dead marram grass at Eccles, 13 January 1935 (R. Gaze) was examined by Miss Lister, who was of the opinion that it was this species.

Physarum sessile Brandza*—On dead stems and grass, Costessey, 11 October, 1930. Miss Lister, to whom the material was sent, found it very puzzling, but is inclined to place it as named here. I collected this species in quantity near Meiringen, Switzerland, the only other European record being from Moldavia ; it has not been recorded previously from Britain.

Diderma montanum Meylan var. *album* G. Lister*—This variety was found on a log at Clippesby, 4 November, 1938 ; it had been recorded previously only from Dorset.

Didymium difforme (Pers.) Duby var. *repandum* G. Lister*—Two gatherings of this variety were made in widely separated localities, Morston and Surlingham, by R. Gaze in January, 1935.

Didymium trachysporum G. Lister*—On dead leaves, Costessey, 18 March, 1938 (R. Gaze).

Didymium anellus Morgan*—On a poplar leaf at Taverham, 12 February, 1935 (R. Gaze).

Lepidoderma chailletii Rost.*—A fine gathering from dead willowherb stems at Stratton Strawless, 14 November, 1935 (R. Gaze) and another from dead leaves at Felthorpe, 5 February, 1939 (H.J.H.).

Comatricha pulchella (Bab.) Rost. var. *fusca* Lister*—On twigs amongst the marrams, Eccles, 13 January, 1935 (R. Gaze).

Cribraria piriformis Schrad. var. *notabilis* Rex*—A poorly-developed gathering on an old sawdust heap, with *Dictydium cancellatum* (Batsch) Macbr. var. *fuscum* G. Lister*, 26 July, 1930.

Hemitrichia leiotricha Lister*—Four small gatherings of this species were made as follows :—on bracken, etc., Costessey, 3 May, 1930 (first Norfolk record) ; on pine needles in an alder carr, 30 August, 1939 ; on grasses, etc., Blakeney Point, 22 January, 1935, and on dead bracken at Costessey, 15 January, 1939 (R. Gaze).

Arcyria insignis Kalchbr. & Cooke*—A fine gathering of the typical form of this species was made from dead wood in Dunston woods, 26 August, 1939. Miss Lister says of it : "The small

sporangia with colourless capillitium marked with close half rings or transverse bands for short distances, somewhat spirally arranged, are characteristic. This species is not uncommon in the tropics and has been recorded also from Germany and Portugal; Dr. Brandza found it commonly in the Moldavian woods; it has not been found previously in Britain."

Arcyria œrstedti Rost.*—This species has been omitted from published records of Norfolk Mycetozoa, but Miss Lister informs me that it was found here by J. Saunders in September, 1907; it was collected again from dead wood at Costessey, 2 May, 1930, by R. Gaze.

Dianema harveyi Rex*—A fine gathering was made from dead wood at Costessey, 30 April, 1930 (R. Gaze).

Other records of interest :—

Physarum conglomeratum (Fr.) Rost.—On a dead leaf, Costessey, April, 1931 (this second Norfolk gathering was made in the same locality as the first).

Physarum didermoides (Ach.) Rost.—This occurred in association with *Physarum straminipes* Lister on grasses on the marrams at Eccles, 9 February, 1935 (R. Gaze).

Diderma asteroides Lister—The second Norfolk gathering of this uncommon species was made from grass and leaves of *Senecio jacobæa* on Blakeney Point, 10 February, 1935 (R. Gaze).

H. J. Howard.

The Rond Snail, *Assiminea grayana* Fleming, in East Anglia. In his book "*British Snails*" (1926), A. E. Ellis described this snail as "common in brackish water and on wet mud in the Thames estuary, and some way up its tributaries in Kent and Essex," adding that it had been recorded also from Blythburgh in Suffolk, from Belgium and Ribe in Denmark. The only other records appear to be those of A. Mayfield, who found specimens in the River Alde at Aldeburgh in 1906 and at the mouth of the Orwell in 1907. Nothing further seems to have been known about its distribution in Britain until 1929, when in the course of searching for other estuarine snails, I found *A. grayana* well established on riverside ronds at King's Lynn, near the mouth of the Bure at Gt. Yarmouth and at Burgh-castle and St. Olave's beside the Waveney. In 1933 I saw this species at Lake Lothing, near Lowestoft and in 1934 came upon a colony on salt-marsh fringing the Cockle Bight on Scolt Head Island. In July, 1944, *A. grayana* turned out to be the dominant snail of all the reed ronds bordering the Waveney from Somerleyton to St. Olave's and from Reedham to within half-a-mile of Cantley on the Yare. Here it was found in great numbers on mud among the reeds, wherever the tides reached, being most abundant near Reedham Ferry, with a concentration of 2,000 snails to the square metre over a zone stretching from the river's brink to where the grass *Glyceria maxima* began to

appear among the reeds at points varying from five to fifteen metres inshore. The *Assiminea* population thinned out rapidly in the area of *Glyceria*'s sub-dominance, and through an inner zone of *Agrostis stolonifera*, disappearing finally in the fringe of orach at the very foot of the marsh wall.

Whether this snail has only recently been extending its range northward or merely escaped the notice of Norfolk conchologists until 1929 is not easy to decide ; but if it had been as abundant in the lower Yare and Waveney fifty years ago as it is now, the shells could hardly have been missed by the collectors whom we know examined the flood debris at Burgh-castle in those days.

A. grayana shows a wide range in its tolerance of the varying brackishness of estuarine waters (1.0 to 30.0 promille chloride). The plants associated with it in one or more of fifteen East Anglian stations fall into three groups :—(1) Typical salt-marsh littoral species, including the scurvy-grasses (*Cochlearia officinalis* and *C. anglica*), sea-spurrey (*Spergularia media*), wild celery (*Apium graveolens*), sea aster (*Aster tripolium*), sea milkwort (*Glaux maritima*), sea lavender (*Statice limonium*), sea plantain (*Plantago maritima*), sea beet (*Beta maritima*), sea purslane (*Obione portulacoides*), annual sea-blite (*Suæda maritima*), glasswort (*Salicornia annua*), sea arrow-grass (*Triglochin maritimum*), sea sword-rush (*Scirpus maritimus*) and the salt-marsh grass (*Glyceria maritima*) ; (2) species characteristic of sub-estuarine river-margins in East Anglia, but occurring also, less frequently, outside the influence of brackish water, including parsley-leaved dropwort (*Oenanthe lachenalii*), marsh sowthistle (*Sonchus palustris*), brookweed (*Samolus valerandi*), orach (*Atriplex hastata*) and glaucous bulrush (*Scirpus tabernæmontani*). Group (3) comprises fresh-water marsh plants typical of reed-ronds in the Yare and Waveney valleys, all of which are to some degree tolerant of brackish water :—meadow rue (*Thalictrum flavum*), marsh marigold (*Caltha palustris*), marsh pea (*Lathyrus palustris*), meadowsweet (*Spiræa ulmaria*), purple loosestrife (*Lythrum salicaria*), marsh pennywort (*Hydrocotyle vulgaris*), water dropwort (*Oenanthe fistulosa*), angelica (*Angelica sylvestris*), marsh bedstraw (*Galium palustre*), valerian (*Valeriana officinalis*), hemp agrimony (*Eupatorium cannabinum*), marsh ragwort (*Senecio aquaticus*), yellow loosestrife (*Lysimachia vulgaris*), water forget-me-not (*Myosotis palustris*), great bindweed (*Calystegia sepium*), water mint (*Mentha aquatica*) great marsh dock (*Rumex hydrolapathum*) yellow flag (*Iris pseudacorus*), fen rush (*Juncus subnodulosus*), the sedges (*Carex riparia, C. acutiformis* and *C. otrubæ*), broad-leaved meadow-grass (*Glyceria maxima*) and reed (*Phragmites communis*) ; to these may be added a few species growing marginally where the reeds are not dominant, viz., cuckoo-flower (*Cardamine pratensis*), the plantains (*Plantago lanceolata* and *P. major*) and the bent-grass (*Agrostis stolonifera*).

At various points in its range, *A. grayana* lives in association with the following molluscs, beginning near the coast with the rough winkle (*Littorina saxatilis*) only at Scolt Head, the estuarine spire-snail (*Hydrobia ulvæ*) at Lynn, Scolt Head, Gt. Yarmouth, Burgh-castle, Lake Lothing and Blythburgh ; *Hydrobia ventrosa* accompanies it at the fringes of the estuaries, penetrating up the Yare as far as Reedham Ferry ; *Amnicola confusa* lives with it at St. Olave's, Somerleyton and Lake Lothing, then leaves it behind and pushes farther up the Waveney to just above Beccles, where Oldham found it in 1921, and again above the range of *A. grayana* in the Yare, where I found it living on the mud under *Glyceria maxima* fringing the river immediately facing the Cantley Sugar Factory in July, 1944 ; *Hydrobia jenkinsi* is present in most of its stations and goes right up into fresh water. Of the molluscs normally inhabiting fresh-water marshes, *Succinia pfeifferi*, *Agriolimax agrestis*, *A. lævis* and *Lymnæa truncatula* occur in reed ronds with *Assiminea* as far down-river as St. Olave's, while a few species less tolerant of brackish water flooding appear where *Assiminea* approaches its upper limit, viz. *Succinia putris*, *S. elegans*, *Vallonia pulchella*, *Cepæa nemoralis*, *Ashfordia granulata* and *Cochlicopa lubrica*. The isopod *Sphæroma rugicauda* is found with it as far up the Yare as Hardley Cross, just where the last of the floating fragments of bladder-wrack are to be seen on the way up the river from Breydon. E. A. Ellis.

Woodlice—*Porcellio spinicornis* Say was found at Waxham and Thorpe-next-Norwich and *P. lævis* Latr. at Waxham in 1944 (A. E. Ellis). *Ligidium hypnorum* (Cuv.) was seen in the wetter parts of Buxton Heath, Hevingham, Swanington Upgate Common and in the Woodbastwick marshes near Horning Ferry this year (E.A.E.).

Tree Grasshopper—A female *Meconema thalassinum* D.G. was found climbing an oak trunk at Whitlingham Sewage Farm, 4/10/44 (G. F. B. Robinson).

Dragonflies in 1944—*Aeshna isosceles*, the large green-eyed dragonfly which in Britain is known only from the Norfolk Broads, continues to maintain itself in its old haunts about Hickling and Catfield. Since E. T. Daniels was able to report that it had survived the sea floods of 1938, few observations on its distribution have been made till this year and now there seems reason for believing that the insect has increased its territory recently in east Norfolk. One was seen hawking over a water-soldier-filled dyke at Haddiscoe on July 8th (E.A.E.) ; others were noticed at South Walsham on August 4th and numbers at Sutton Broad on August 8th (A.E.E.) The small, slender-bodied kinds of dragonflies are weak in flight and unlike the powerful hawker and darter types do not excel in catching other insects on the wing. Little seems to be known of

their methods of hunting, but they have a stealthy way of sidling round the stems of marsh plants and it may be their habit to pounce on other insects climbing the stalks. A female *Ischnura elegans*, one of our commonest small dragonflies, was seen eating a caddis-fly (*Colpotaulius incisus*) of almost its own weight, under sedges at Surlingham Broad on June 22nd. The caddis, an energetic and slippery insect of the fen undergrowth seemed an odd kind of prey for such a weak captor; being a night-flier it was most probably caught while at rest during the day.

The earliest *Brachytron pratense* was seen on the wing at Wheatfen, May 29th; the first *Aeshna grandis* near St. Olave's Bridge, July 17th; *Aeshna mixta* was common in the Yare Valley in late August and September; the first *Aeshna cyanea* (teneral) was noticed at Blofield, July 13th and the species was less common than usual in August; *Libellula quadrimaculata* was common in the Yare Valley in June, a male being seen at Brundall so early as May 21st; *Libellula depressa* (mainly a pond and up-river insect) was common in suitable localities, the earliest being seen by Mr. A. H. Turner at Wendling on May 27th; *Sympetrum striolatum* was very common in East Norfolk from mid-August to October; dozens of newly-emerged *Lestes sponsa* were seen along a dyke near Haddiscoe Dam, July 8th; *Pyrrhosoma nymphula* began emerging in the first week of May at Wheatfen and was not quite so common as usual in the Yare Valley this year. (E.A.E.)

HETEROPTERA (BUGS)—The small Cydnid, *Legnotus limbosus* (Geoffr. in Fourcr.) was found in a hedge-bottom at Brundall, 6/7/44; this insect is uncommon in Norfolk and the only published record of it here gives Arminghall as its station; specimens in Norwich Castle Museum bear labels which show that H. J. Thouless took one from Norwich Cemetery c. 1900 and J. Edwards another from a hedgebank at Old Lakenham in August, 1905. The Coreid, *Alydus calcaratus* (L.), an ant-mimic which frequents sandy ground, was seen at Buxton Heath, Hevingham, 30/7/44; Thouless and Edwards found this species several times at Dunston Common and Mousehold Heath, up to 1900 and E. A. Butler recorded it from Southrepps in 1883. The Mirid, *Stenodema* (*Brachystira*) *calcarata* (Fall.), which keeps going through the winter in grass-beds, can remain active at quite low temperatures; a male was found climbing leaves of *Glyceria maxima* at Bradeston on January 2nd, 1944, when the temperature was only two degrees F. above freezing-point. The rare water-bug, *Aphelocheirus montandoni* Horvath was found in Norfolk first in 1874 by J. Landy Brown, in a running stream at Costessey; it was not seen again till 1942, when E. T. Daniels recorded it as numerous in the River Wensum, below the New Bridge at Norwich; in April, 1944, Dr. W. H. Thorpe re-discovered it at Costessey and later this year found it in several places along the Wensum and its

tributaries; dredging and netting the River Yare at Lakenham, Harford Bridges and Colney proved unsuccessful. (E.A.E.).

Thorn-Like Insect.—A specimen of *Centrotus cornutus* L., the only British Homopteron camouflaged to look like a thorn among the bushes, was found on a window-pane at Wendling in July, 1944 (A. H. Turner). It has been recorded previously in this county from Foxley Wood and hedgerows at Ketteringham, by Edwards and Thouless.

Apple Shoot Weevil—While some cordon apple trees were being examined in May, a little shoot-boring weevil (*Rhynchites cæruleus* De Geer) was noticed in the act of boring a tunnel transversely into a young shoot two inches from the tip. About four inches of this shoot were carefully removed without disturbing the weevil, placed in a Petri dish and the lid put on. This was done to allow of further observation without upsetting the insect at work. The boring and egg-laying were completed, then, after a short rest, a second and third operation of the same kind took place, each time nearer the apex of the shoot. Two fresh shoots were then put in the dish and each was subjected to one boring and egg-laying. Each hole took about three-quarters of an hour to make, the weevil thrusting its rostrum in and out repeatedly until it was able to push it down to its full extent. The rostrum was then withdrawn; an egg was laid over the mouth of the boring and manœuvred into position by the rostrum which was then used to push it right down. The operation was completed by smoothing the opening with pushing and drawing movements of the rostrum. The weevil is of a glittering blue colour, elegant in appearance and altogether a very interesting little creature to watch. (G. E. Deacon).

Beetles boring through Linoleum—While I was discussing damage by wood-boring beetles with an acquaintance in Yarmouth, I was told that some had "even come up from the floor-boards and eaten through the floor-cloth." I ventured to doubt this, because the commoner boring beetles will rather die than cut through a thin coating of paint, or even paper. However, I was afterwards shown the holes and the beetles which made them. The borings were a trifle larger than those of *Anobium striatum* and the beetles too were rather stouter. Investigation showed that they were another bunch of undesirable aliens—*Ptinus tectus* Boield—not previously noted for this county. (P. E. Rumbelow).

Blister Beetles—From time to time, often at intervals of five years or more, swarms of the large metallic-green blister beetles, *Lytta vesicatoria* L. appear on privet hedges, lilac and ash trees in various parts of Norfolk, most often in coastal districts. It is possible that some at least are immigrants from the European mainland (on one occasion I received a specimen from a lightship), but the

erratic nature of their appearances may be due to climatic factors or to the local distribution of the bees which they parasitize. During the first week of July, 1944, blister beetles turned up at Edingthorpe and Brundall, and one of the former laid a batch of several hundred eggs on damp earth at the bottom of a jam jar. A month later, swarms of very active little triungulin larvæ, rather like birdlice, emerged from these eggs and after a short period of wandering about the jar, crept under dead leaves and into the soil-crevices, where they lay more or less dormant.. Unlike the triungulins of the common oil-beetle, *Meloe proscarabæus* L., they did not swarm in writhing masses at the highest points they could reach, for the purpose of clinging on to the legs of bees visiting flowers. Dr. F. I. van Emden subsequently informed me that the French entomologist, Beauregard, in 1890, proved that the larvæ of *Lytta vesicatoria* burrow in the soil for nests of gregarious solitary bees, especially *Colletes ;* he also reared them successfully in nests of *Megachile* and, less easily, *Osmia tridentata.* Two cells of the bee are required as a rule, and the full-grown larva leaves the cell and burrows into the soil where it rests over winter and sometimes overlies for a full year (with two winters) as a pseudo-chrysalid. Only freshly made cells can be used, in which there is an egg or very young larva or even no stage of the bee ; cells with the older stages of the bee do not contain enough honey. The natural host bees used by *Lytta* in Norfolk have yet to be determined ; we have three out of the seven British species of *Colletes*, six out of nine *Megachile* and five out of eleven *Osmia.* (E.A.E.).

1944 A Great Year for Ladybirds—By the end of June it became apparent that East Anglia was experiencing the worst blackfly season for ten years ; broad beans and later, sugar beet were badly affected by *Aphis rumicis* and many other kinds of aphids were unusually numerous. Fortunately, by way of a corrective, ladybirds were also very abundant and must have taken a great toll of the aphids. Similar conditions seem to have prevailed on the other side of the North Sea and there were reports in the press describing the arrival of millions of seven-spot ladybirds (*Coccinella 7-punctata*) on the south-east coast between July 30th and August 4th and others flying in " like a black cloud " on the Lincolnshire coast on August 30th, presumably from the Continent. The " hundreds of ladybirds " seen at Cromer on August 25th by Miss R. S. Heward and at Overstrand on the following day (H. Hunt) may have formed part of similar migratory swarms ; but it is well known to entomologists who live on the coast that winds from landward frequently bring vast numbers of beetles and other insects, and deposit them in the shelter of the cliffs ; I have known this to account for great aggregations of ladybirds on the coast between Gorleston and Lowestoft in previous years.

The following observations were made on the various kinds of Norfolk ladybirds in 1944. (1) *Coccinella 7-punctata* (the common

large red ladybird) : many came out of their winter hiding-places in thick hedges on bright days in January, February and March, and were seen basking on wayside banks, sometimes in clusters of as many as five together ; in April they became more active, swarming up gorse bushes and evergreens and resorting to beds of young nettles ; throughout May they were mating and egg-laying on black-currant bushes, nettles, thistles, etc., and on potato tops in early June ; by mid-June the over-wintered specimens had died off and their grubs were feeding on aphids everywhere ; on July 8th many adult ladybirds of the new generation began to emerge from the pupæ which were very numerous and noticeable in the potato fields ; they went on emerging throughout July and by the end of the month their great abundance was being remarked upon all over the county ; during August they were common in the fields and many males frequented *Angelica* flowers on the marshes until early October ; by the end of October they were mostly hidden away in thickets and hedges for the winter.

(2) *Adalia bipunctata* (two-spot ladybird) : from January to mid-April this species was found hibernating in dead leaves under evergreens, heaps of hedge-cuttings, stack-yards and buildings ; at the end of April numbers congregated on black-currant and rose bushes, willow, apple and other trees liable to early aphis attack ; mating and egg-laying went on throughout May and the old generation of ladybirds died out for the most part by mid-June. Adults of the next brood were found mated among black-fly on broad beans at Wheatfen (M. J. D. Cockle) on July 4th ; on July 12th vast numbers of pupæ and newly-emerged adults were seen on osiers bordering the River Yare at Brundall ; a further generation was reared on many kinds of aphids on docks, thistles, potatoes, lettuces, etc., during July and August and in the autumn months males were found with other ladybirds taking nectar from *Angelica* flowers on the marshes. At the end of October the insects swarmed into houses and the other usual hide-outs for the winter.

(3) *Synharmonia conglobata* (anchor-marked yellow ladybird) : this species was found hibernating under dead leaves and in moss on tree trunks in January and February, but was only moderately common, usually in the company of *A. bipunctata* in the spring ; mating was observed in May ; a freshly emerged adult of the next generation was found on foxglove in Surlingham Wood on June 24th and the species became fairly common in August, when males, as usual, visited *Angelica* blossom on the marshes.

(4) *Anisosticta 19-punctata* (19-spot ladybird) : this species is almost confined to marshes ; it hibernates in litter and in hollow stems and leaf-sheaths of reeds, reed-mace, sedges, etc., emerging to mate and lay eggs in May ; in 1944 its greyish larvæ were very numerous, feeding on aphids on reed leaves in June and July in the Yare and Waveney valleys ; adults were emerging at St.

Olave's on July 8th and others at Surlingham the following day. (5) *Adalia* 10-*punctata* (ten-spot ladybird) : less common than usual. (6) *Coccinella* 11-*punctata* : apparently rare this year. (7) *Calvia* 14-*guttata* : mainly a woodland species ; not so numerous as in other years at Wheatfen (M.J.D.C.). (8) *Micraspis* 16-*punctata* : very few seen, though this species is usually abundant on upland fields, sometimes hibernating under hedge-trimmings gregariously in thousands packed together. (9) *Thea* 22-*punctata* : fairly common, but not more so than usual. Several rarer Norfolk species are omitted from this list.

Of the two species showing spectacular increase (*C.* 7-*punctata* and *A. bipunctata*) of economic importance, it should be recorded that both were rather plentiful in 1943 and that an unusually dry winter and spring must have contributed to their successful hibernation. Two points arise as a matter of interest to agriculturists ; first, the importance of hedgerows and small patches of woodland for the hibernation of ladybirds ; second, the tremendous contribution of 2-spot ladybirds made by willows in our river valleys, which undoubtedly had the effect of reducing black-fly on local sugar-beet in July and August. (E.A.E.).

Hornets Increasing—Until about ten years ago, the finding of a hornets' nest in this county was considered " news " and only very occasionally was one recorded ; recently, however, more and more have been found in all quarters of Norfolk and especially in the immediate neighbourhood of Norwich. In 1944 there were colonies at Crown Point, Old Lakenham, Earlham, Attlebridge, Frettenham, Thorpe, Brundall, several in the Thetford district and a few in north Norfolk. At Wendling, near Dereham, Mr. A. H. Turner reported that they were unusually common this year, with several nests in that area ; on one occasion two worker hornets were found snared in the web of a spider (*Aranea reaumuri* Scop.) and rolled up; Mr. Turner remarks that the spider must have shown considerable pluck—he has seen this species roll up wasps and bees with great rapidity, but never hornets before.

Resident Butterflies in 1944—The large tortoiseshell (*N. polychloros*) re-appeared in a few Norfolk localities this year ; one at Thorpe-next-Norwich, April 8th (A. E. Ellis) and one at Wheatfen Broad, April 19th (M. J. D. Cockle) were the only over-wintered specimens reported ; at Ellingham Hall, near Bungay, Mrs. Lockhart Smith found one newly-emerged on July 31st and several others later ; at Wheatfen, single specimens were seen on July 25th, August 5th and September 14th. The peacock (*N. io*) did not come through hibernation in such numbers as usual, but was widely distributed ; a few came forth in many parts of the county on the first real " butterfly day " of the year—March 26th and odd specimens persisted until late June (one at Wheatfen on 23rd) ; the first butterfly of the new brood was seen at Brundall on July 26th and the species was fairly common generally in August. The

comma (*P. c-album*) was rather scarce in the spring; one was seen at Thorpe-next-Norwich on April 6th (A. E. Ellis) the first summer specimen was noticed at Wendling on August 7th (A. H. Turner) and a few others there later; at Wheatfen, small numbers were seen frequently from September 11th to October 24th, with a maximum of eight on October 13th (M. J. D. Cockle); at Frettenham the species was fairly common in September and October (A. N. Garrett) and M. D. Joel saw specimens at Happisburgh on September 16th and 30th; there can be no doubt that the comma is still holding its own as a recent newcomer to the county. The white admiral (*L. camilla*) was seen in a localised area of Hargham Woods (as in 1943) in July (G. H. Buncombe); also in July at Wheatfen Broad, Sprowston, West Runton (A. C. Savin) and on the Acle New Road (M. J. Seago); odd specimens persisted at Ellingham up to August 6th (Mrs. Lockhart Smith) and one, very ragged, to August 8th at Wheatfen (M. J. D. Cockle). The grayling (*E.semele*) is seldom known to wander far from the stony heathlands tufted with the sheep's fescue grass on which its caterpillars feed; perhaps some freakish trick of the wind was responsible for the appearance of specimens off the beaten track in mid-August, when one was noticed at Wheatfen and another in a Norwich street. The holly blue (*L. argiolus*) was commoner than usual, especially in the spring, throughout the county. The white-letter hairstreak (*S. w-album*) was seen again at West Runton (A. C. Savin). The dingy skipper (*E. tages*) was more widespread than usual.

The swallowtail (*P. machaon*) was fairly common near the Broads from mid-May to the third week of June and again for a short period in August. A totally black specimen, the first ever recorded from the Yare Valley, was visiting flowers of ragged robin at Wheatfen on May 29th; it was not molested. (E.A.E.).

Migrant Butterflies—A few red-admirals (*V. atalanta*) appeared at Catfield early in March and one was seen on high ground at Brundall on March 26th; odd specimens in rather poor condition were seen here and there during April, including one at Foulsham on the 13th (R. H. Hall); a fresh influx came at the beginning of June, when several were seen at rhododendron and other flowers at West Somerton between the 9th and 13th only (E. P. Wiltshire) and one at Wheatfen on the 12th. A single faded specimen was seen at Attleborough on July 14th (G. H. Buncombe) and another near St. Olave's Bridge on the 17th. A fresh specimen was seen flying N.E. at Wendling on August 7th (A. H. Turner) and another at Wheatfen on the 12th; towards the end of August and through September they became fairly numerous throughout the county and specimens were last seen at Wheatfen on October 14th. M. D. Joel found caterpillars of the red admiral on nettles at Lessingham on August 30th and these had gone five days later. The year was notable for the almost complete absence of the painted lady (*V. cardui*) in Norfolk; one was seen

flying westward at Wendling, near East Dereham, July 5th (A. H. Turner) and another visiting Buddleia flowers in Norwich in August (E. C. Smith). One Camberwell beauty (*N. antiopa*) was reported from Aylsham, August 25th (R. F. Kerrison).

While no large-scale immigration of white butterflies was observed here in 1944, it is likely that the large whites (*P. brassicæ*) seen passing westward over the marshes in small numbers at Wheatfen on May 28th and 29th formed part of a real, if unspectacular, migratory movement. *P. brassicæ* never became very numerous, except " in spots " in September, when eggs were laid on Brussels sprouts and other greens, resulting in caterpillars which went on feeding in some cases until the end of November (one was found still living outdoors at Brundall on December 20th. E.A.E.). The small white (*P. rapæ*) began to appear on the wing during the second week of April ; it became moderately common during May and a second brood emerged early in July ; eggs were laid again from mid-July to August, resulting in a partial third brood in the autumn ; the caterpillars were more numerous on cabbages in late autumn than in most years. There may have been some local immigration of this species in July, since small whites were seen crossing the Channel from France to England at that time.

Only one clouded yellow (*C. croceus*) seems to have been noticed : a very " worn " male at Downham Market (E. C. Smith) on August 28th.

Migrant Moths—Single specimens of the convolvulus hawk-moth (*H. convolvuli*) were seen at flowers of *Nicotiana affinis*, Wendling, September 16th (A. H. Turner) and on a derelict ship lying on the beach at Happisburgh, October 1st (M. D. Joel). The month of July was notable for the number of humming-bird hawk-moths appearing all over the county and visiting a variety of flowers in gardens, from the 6th onward ; from July 5th to 7th dozens at a time were seen by our invasion forces crossing the Channel, flying from boat to boat and making for England, in company with a few small tortoiseshell and small white butterflies (K. G. Durrant). The silver Y (*P. gamma*) was reported by Mr. A. H. Turner to have been unusually scarce this year (first seen at Wendling on June 18th) ; the diamond-back (*P. maculipennis*) was also far less common than usual (first seen at Wendling by A. H. T. on May 26th).

Air-Borne Caterpillars Endangering Planes—During a sudden onset of calm warm weather at Whitsun, vast numbers of Tortricid caterpillars were seen to launch themselves on silk-thread parachutes from oak trees in East Norfolk. Evening breezes appear to have carried many of them to a good height, and the phenomenon seems to have been fairly general, because aeroplanes coming in to land at the time experienced serious trouble with their air-speed indicators, due to blockage by these caterpillars blown into them during the homeward flight. Fortunately there was no recurrence of the trouble, as the weather changed immediately afterwards. (E.A.E.).

XII

OBITUARY.

JIM VINCENT.

By the passing of Mr. Jim Vincent of Hickling, Norfolk has lost a great ornithologist and a remarkable personality, with deep religious convictions. Born at Hickling, his father early laid the foundations of Jim's unrivalled knowledge of bird life by going through a bird book with him night after night, and teaching him their plumage and habits. At the age of 19, Jim Vincent had already acquired much knowledge of birds, and the late Lord Lucas who had recently hired Hickling with a view to turning it into a bird sanctuary, selected Jim to look after and organise it. Later he was joined by the late Sir Edwin Montagu, afterwards Secretary of State for India and the late Sir Edward Grey, afterwards Lord Grey of Fallodon.

During the Great War 1914-18, Jim Vincent served in the Inland Water Transport, for which he was well suited by his life on the Broad. After the War, as the bird sanctuary developed, in the ownership of the late Honorable Ivo Grenfell, followed by his father, Lord Desborough, Jim Vincent, in addition to his duties of head keeper of the estate, resumed charge of the sanctuary and was made bailiff of Hickling Broad. He was a loyal and devoted servant to Lord Desborough for many years, and was still in his service at the time of his death.

His reputation as an ornithologist was in fact international, and in recent years he had visited the bird sanctuaries in Holland ; he was well known to the public by his many articles on the subject and by his broadcasts on life of Hickling Broad. In 1943 he was elected President of the Norfolk and Norwich Naturalists' Society. Though he was best known as a " bird man," as he liked to call himself, Jim was a man of many parts and a natural leader. He was a first class shot, and an expert fisherman, especially for pike. In recent years he used

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Jim Vincent with two young Marsh Harriers

to spend a few days on the Wye, and was equally successful when it came to spinning for salmon on that famous river. He also won many races in a sailing punt, and was a past master in the art of " quanting."

He devoted much time to all the interests of his native village, and featured largely in many aspects of public work. He was well known as an expert on the drainage problems of his district ; there were indeed few public activities in North East Norfolk with which Jim was not connected and he also found time to conduct an extensive correspondence on matters relating to natural history. In August 1938, he became an air raid warden and continued in the service until his death.

He was a wonderful companion and could talk well on many subjects. A keen and accurate observer, he was at his best when showing some interested visitor to the sanctuary, some rare bird or its nest. Many will remember him as the " Admiral of the Fleet " on the thrilling occasion of the annual coot shoot on the Broad as he shouted his orders from the centre of the long line of punts. Those who were fortunate enough to be invited to Whiteslea for duck flighting carried away many happy memories of his cheery greetings to old friends, and noted the trouble he took to put any novice at his ease by explaining the plan of campaign and imparting that sense of anticipation and adventure, which add so much to the enjoyment of a flight.

Jim had an uncanny knowledge of the reactions of weather conditions on duck and other wildfowl, but was always ready to try out new theories or to adopt any reasonable suggestion, though it hardly ever paid to go against his advice. After the evening flight, when the guns had settled down before a large log fire after supper, it was his custom to come in and discuss plans for the morning flight and he would often keep the party enthralled for an hour or so with reminiscences of " the great days in the distance enchanted " when the pochard roared down from Horsey in their thousands across Whiteslea ; he had the power of giving very graphic descriptions and could tell many an interesting anecdote of hits—and misses—of well-known personalities who had shot at Hickling. Long before dawn next morning he was up and about and one can remember vividly his smiling morning face at the bedroom door as he

looked in to announce " a grand morning with a strong wind from the nor' east and scuds of snow." He was never happier than when seeing others enjoy themselves, and no one in his company could fail to do so. On one occasion he was summoned to Sandringham by King George V and treasured a memento of that visit.

Possessed of a strong and fearless character, he lived up to his high principles, and was sympathetic and generous to a degree ; endowed with a keen sense of the artistic he saw beauty everywhere in nature. His many friends will treasure his memory. He leaves a widow and two sons, both of whom are now serving in the R.A.F.

PRESENTED

MEMBERSHIP.

The Society consists of two classes of Members, viz., Ordinary and Honorary Members.

Ordinary Members may be proposed and elected at any meeting of the Society. The Annual Subscription is 10s., payable in advance on election, subsequent subscriptions becoming due on the last Tuesday in March annually. This subscription may be compounded for by a single payment of £8.

Ladies and Gentlemen distinguished for their attainments in Natural Science, or who have rendered valuable services to the Society, may be nominated by the General Committee as Honorary Members, and elected by a show of hands at the next meeting of the Society. Such Honorary Members have all the privileges of Ordinary Members.

SALE OF TRANSACTIONS.

Copies of past issues of this Society's Transactions may be obtained upon application to the Assistant Secretary, c/o The Castle Museum, Norwich, at the following rates :—

All parts of the current volume will remain at full publication price (10 shillings), and thereafter be obtainable at 2s. 6d. for each part, save that no part shall be sold at the reduced rate until three years after publication. The Society's stocks of early numbers have been drastically reduced recently and some parts are out of print (chiefly in Volumes 1 to 8.)

PRESENTED
12 SEP 1947

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12 SEP 1947

TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

FOR THE YEAR

1945

VOL. XVI PART II.

EDITED BY MAJOR A. BUXTON

NORWICH
PRINTED BY THE SOMAN-WHERRY PRESS LTD., NORWICH.
FEBRUARY, 1946

PRICE 10/-

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" " "	1870—71
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E. C. KEITH	1940—41
A. J. RUDD	1941—42
MISS C. E. GAY	1942—43
SIR H. E. S. UPCHER	1943—44
H. W. BACK	1944—45
	1945—46

TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

FOR THE YEAR

1945

VOL. XVI PART II.

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NORWICH
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FEBRUARY, 1946

Norfolk and Norwich Naturalists' Society

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H.M. THE KING

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(to retire 1948)	(to retire 1947)	(to retire 1946)

Ex-officio: MISS G. V. BARNARD

NEW MEMBERS, CHANGES OF ADDRESS, etc.

NOTE.—Instead of the full list of members, only alterations are given.

NEW MEMBERS.

Backhouse, Rev. T. P., The Rectory, Caistor St. Edmund, Norwich.
Bainbridge, P., Orchard Hill, Coltishall, Norfolk.
Begbie, D., Apple Acre, Barford, Norfolk.
Begbie, Mrs. Apple Acre, Barford, Norfolk.
Chenevix-Trench, C. G., Rocklands, Weybourne, Norfolk.
Coke, Col. R. E., Oaklands, North Street, Sheringham, Norfolk.
Colman, Timothy, Framingham Chase, Norwich.
Corfe, J. W., Rose Cottage, Norwich Road, North Walsham, Norfolk.
Cozens-Hardy, B., 16, Albemarle Road, Norwich.
Curtis, G. J., The Laurels, Brundall, Norwich.
Forsythe, J. A., Mill Road, Hethersett, Norwich.
Gould, D. P., Lime Tree House, Lime Tree Road, Norwich.
Harmer, R., Jesmond, Brundall, Norwich.
Hinde, Robert, 31, Mount Pleasant, Norwich.
Horton, R., Mascalls, Brentwood, Essex.
Johnson, F. E. B., Lynton House, Ixworth Thorpe, Bury St. Edmunds, Suffolk.
Kirkby, Pilot Officer P., 31, Belle View Road, Ashbourne, Derbyshire.
Lockett, Col. V., Crown Point, Norwich.
Mackenzie, P. Z., Wad Medani, Sudan.
Makins, W., Wood Farm, Little Fransham, East Dereham, Norfolk.
Mayhew, Lady, Felthorpe Hall, Norfolk.
McLean, A. S., Humbletoft, East Dereham, Norfolk.
McLean, D. C. H., Humbletoft, East Dereham, Norfolk.
Middleton, W. H. H., Riverside, Costessey, Norwich.
Pardoe, J. P., St. Helena, Dunwich, Suffolk.
Pardoe, Mrs. St. Helena, Dunwich, Suffolk.
Pask, Mrs. D. K., Gordon House, Cromer Road, Aylsham, Norfolk.
Pask, T. E., Gordon House, Cromer Road, Aylsham, Norfolk.
Paulson, C. W. G., Woodside Cottage, Wheelers Lane, Smallfield, Surrey.
Payne, Mrs. A. U., Taylor's House, Felstead, Essex.
Pennethorne, Miss R. S., 135, Newmarket Road, Norwich.
Renshaw, Sir Stephen, Great Fransham, East Dereham, Norfolk.
Richardson, R. A., c/o Gordon House, Cromer Road, Aylsham, Norfolk.
Savory, Alan, Brundall, Norwich.
Templewood, The Rt. Hon. the Viscount, Templewood House, Northrepps, Norfolk.
Tridge, Mrs. E. M., 104, Hayes Way, Park Langley, Beckenham, Kent.
Tridge, H., 104, Hayes Way, Park Langley, Beckenham, Kent.
Wharton, Miss B. M., Wood Farm, Spixworth, Norwich.
Wilson, Capt. C. B., Irstead Lodge, Neatishead, Norfolk.

CHANGES OF ADDRESS.

Brooks, C. J., 49, Harvard Court, Hampstead, London, N.W.6.
Buncombe, G. H., The Grove, Pier Plain, Gorleston, Gt. Yarmouth.
Collins, W. A. R., 14, St. James' Place, London, S.W.1.
Copeman, T. D., The Oaks, Hethersett, Norwich.
Farrell, Miss E. M., 1, Eaton Road, Norwich.
Macpherson, A. Holte, 12, The Beacon, Exmouth, Devon.
Mahood, A. E., Sunny Haven, Haynford, Norwich.
Turner, A. H., Forest Drove, Bickenhall, Hatch Beauchamp, Taunton, Somerset.

MEMBERS LOST BY DEATH.

Mr. E. C. Stuart Baker, Mr. E. C. Bedwell, Capt. M. J. D. Cockle, Mr. E. W. Cozens-Hardy, Dr. K. Fisher, Surg. Capt. A. W. B. Livesay, Dr. George Master, Mr. Philip Norgate, Mrs. A. H. A. Rowley, Sir Gerald Talbot.

NORFOLK AND NORWICH NATURALISTS SOCIETY, 1944-45.

GENERAL ACCOUNT.

	£ s. d.	£ s. d.		£ s. d.
April 1, 1944			By Transactions	130 15 0
Balance as per a/c Barclays Bank	2 14 4		Library Rent	6 5 0
Add Cash in Bank	2 15 0		Assistant Secretary, Honorarium	15 0 0
		5 9 4	Sundry expenses—	
Balance E. Anglinn Trustee Bank	93 1 3		Stationery	2 15 0
Do. Interest	2 17 4		Printing	1 0 0
		95 18 7	Insurance	13 6
Subscriptions		116 13 0	Scientific Societies Subs.	7 6
Do. Publication Fund		1 11 0	Postage, etc.	1 12 11
Sale of East Anglian Flora	5 10 3			6 8 11
,, Transactions	2 6 0			
		7 16 3	Balance Barclays Bank	4 5 1
,, Scolt Head Book by Heffers		21 10 9	East Anglian Trustee Bank	95 18 7
Interest on Iuvestments		9 13 8		100 3 8
		£258 12 7		£258 12 7

LIFE MEMBERSHIP ACCOUNT.

	£ s. d.		£ s. d.
To Balance April 1, 1944	63 17 4	By Refund to Mr. Chandler	8 0
,, Mr. C. Chandler 8 8 0 Life subs.		,, Balance on E.A. Trustee Bank	83 7 7
,, Mr. E. P. Wiltshire 8 0 0 ,, ,,	16 8 0		
,, Interest on Investment	1 15 0		
,, Interest E.A. Trustee Bank	1 15 3		
	£83 15 7		£83 15 7

LIBRARY ACCOUNT.

	£ s. d.		£ s. d.
To Balance April 1, 1944	46 1 9	By Subscription to Entomologist Socicty	1 0 0
,, Interest E.A. Trustee Bank	1 3 4	,, Balance E.A. Trustee Bank	46 5 1
	£47 5 1		£47 5 1

I have checked the above figures with the Bank Statement and Pass Books and Certify they agree.

C. R. A. HAMMOND,
Hon. Auditor.
8th May, 1945.

I

HON. SECRETARY'S REPORT.

The 76th Annual Meeting was held at Norwich Castle Museum on May 26th, 1945. The Hon. Treasurer presented the balance-sheet for the year. The following officers were elected :— Mr. H. W. Back to be President in 1945-46 and Mr. R. G. Buxton President-elect ; Miss C. E. Gay to be Hon. Treasurer ; Lady Mayhew and Messrs. G. F. B. Robinson and E. L. Swann to serve on the committee for three years in the places of members retiring by rotation. Mr. C. R. A. Hammond was re-elected Hon. Auditor and Mr. H. W. Back Hon. Secretary.

Mr. Russell J. Colman, Dr. Robert Gurney and Mr. Arthur Mayfield were elected Honorary Members in recognition of past services to the Society and to Natural Science. Thirty-eight new members were elected.

The sum of £50 was voted as a donation to the Norfolk Naturalists' Trust, towards the purchase of Broadland nature reserves.

A Geological Section of the Society was formed and Mr. R. Pearce Gould appointed Geological Recorder. Members intimated their willingness to assist in reporting details of gravel-pits, well-borings, etc. of recent origin in various parts of the county.

Sir Henry Upcher delivered his Presidential Address on " A Few Aspects of Norfolk Farming," and included an account of the work of the Norfolk War Agricultural Committee during the War.

With the continuance of transport difficulties, only one excursion was held in the summer of 1945 ; this was to the Norfolk Naturalists' Trust property at Weeting Brecks, in June, when with the assistance of Mr. Parrott members spent an enjoyable afternoon seeing many characteristic Breckland birds and plants.

II

THE JUNIOR BRANCH OF THE NORFOLK AND NORWICH NATURALISTS' SOCIETY.

Annual Report, 1945.

The Junior Branch is primarily intended for those young people who being at school or college are unable to attend the meetings of the Senior Society, but others interested are eligible.

The Annual Subscription is 2s. 6d.

The present membership numbers 80.

Owing to transport difficulties, no meetings could be held during 1945.

BALANCE SHEET for the Year ending 30th September, 1945

Receipts	£	s.	d.	Expenditure	£	s.	d.
Balance from 1944 Account ...	7	4	4	Norfolk Wild Bird Protection Committee	1	1	0
				Postages		1	5
				Balance in haed	5	17	11
	£7	4	4		£7	4	4

Patricia H. I. Meade.

III

PRESIDENT'S ADDRESS

Delivered by Sir Henry Upcher to the members of the Norfolk and Norwich Naturalists Society at Castle Museum, Norwich, on May 26th, 1945.

NORFOLK FARMING

As Norfolk is the premier Agricultural County in England, I did not think it would be out of place to say something about Norfolk Farming, with which I have been closely connected all my life. When I took over the management of the Hall Farm at Sheringham in 1894 farming was a very different proposition to what it is to-day. The internal combustion engine was only in its infancy and had not been adopted for tractor work : one was therefore entirely dependent on horses for all farm work. Deep ploughing, as we know it to-day, was out of the question and the only way to break up a plough pan was to have one plough following the other without a breast—even if one wanted a bit ploughed only a few inches deeper than usual and made the ploughman alter the depth, he resented it and put it back as soon as one was out of sight. In those days farm work was a regular routine, since practically all the leases insisted that the farm should be run on the four-course system, and outgoing tenants were dilapidated if they broke it.

In those days fertility was mostly maintained by fattening bullocks in yards and by sheep penned on the land. On the lighter lands large flocks of ewes were kept, many thousands of lambs being sold at the July sales. These lambs went on to the second crop grasses, and were eventually fattened on roots during the winter or kept as stores and sold in the spring to go on to the good marshland grasses. A few cows were kept, but not the large herds that we see to-day all over the country. Store bullocks were mostly bought in the autumn and fattened in boxes and yards. This programme suited both farmer and his employees, as it insured work all the year round, with fencing and ditching being attended to when men could be spared. Therefore farming was a much less strenuous business

than it is to-day : you knew exactly what to do almost to a day. Labour was plentiful—but wages were very different, 12s. per week being the regular wage, with extra money at haysel and harvest. How the labourers managed to bring up a family on this wage has always been a mystery to me.

To-day things are very different. The crops grown are more varied, sugar beet has come in and many vegetable crops are grown. Many more cows are kept to the exclusion of bullocks and the hurdled sheep have almost disappeared. Between the wars farming had its ups and downs, mostly downs : the chief change being the great increase in the number of cows all over the county.

So much for a general outline of farming, but there is another phase of farming, namely the Small Holdings. This should interest every ratepayer in the county—since ratepayers are the owners. In 1908 the Small Holdings and Allotments Act was passed. Previous to this the Norfolk County Council had bought two farms, the Chapel Farm of 91 acres in Nordelph in 1904 and the Parkfield Farm at Outwell of 75 acres in 1907 ; these farms were let off to 59 tenants. Under the 1908 Act farms were bought all over the county and other farms were hired. By Michaelmas 1910 the County had bought 3,338 acres and had hired 2,176 acres and had placed on them 562 tenants. By Michaelmas 1916 this had risen to 9,964 acres bought and 4,000 hired and occupied by 1,349 tenants. To-day the total acreage purchased is 31,294 and land hired 634, with 1,896 tenants. Of the 4,000 acres hired land referred to above, 524 acres have since been purchased, 473 acres are still hired and 300 acres have since been given up by the Council ; most of this was bare land. The Council have erected 224 houses and many sets of farm buildings.

I have spoken at some length about the County Small Holdings because I have discovered that many ratepayers are not aware that they are big landlords. There is no doubt that the Small Holdings Movement has been very successful in Norfolk. It has enabled many to lead a free and independent life, though it necessitates much hard work and long hours. It has also been the stepping stone for some to move on to bigger farms. Moreover, it is a good thing for the County as every year the Council is in a better financial position. In order

to buy these farms the money was borrowed on the basis of capital and interest repayments over a term of years, so that each year a certain amount of capital is written off and in due course the County will own a valuable property free of all debt.

I must say a few words about the farming in Norfolk during the War. Some of us had had a taste of war-time farming during the 1914—1918 war—though on rather different lines. On the outbreak of war in 1939 the War Agricultural Committees immediately came into being, with wide powers. The foundation had already been laid, various sub-committees were formed and district committees set up. The County was divided into 15 districts: the Rural District Council areas were taken as being already defined areas and a district officer was appointed for each district. These all worked under Mr. Rayns, the Chief Executive Officer. Mr. J. C. Mann was the Deputy Executive Officer and Mr. Trory the Secretary—on his death Mr. J. Christie became Secretary. The district committees reported on the farms in their district and divided them into three classes, A, B, and C. The C farmers were urged to improve their methods, advice was given and help to obtain improvement. The B farmers too were pressed to try and get into Class A. Free advice and suggestions for cropping and fertilising were given and soils were analysed free. Those who would not respond were put under cultivation orders for each field with a detailed programme of cropping and manuring. If these instructions were not obeyed the Ministry of Agriculture was requested to eject them from their holding. In a few cases occupiers were summoned before the local Bench of Magistrates for not carrying out orders to grow particular crops, and fined.

As the District Committees got to work they had to report on what grass land they considered should be ploughed up. The farmers too were asked to co-operate and suggest which fields they should plough. The target given to the Committee for the first year was 20,000 acres of grass, but this was nearly doubled. The following year a similar target was again nearly doubled. Up to date 136,000 acres of grassland have been ploughed; of this 8,399 acres have been directly reseeded. The Committee soon found that there was a good deal of land which had become derelict and that there were various

heaths which were growing nothing but bracken, gorse, etc.

The largest block of land which had become derelict was in the Feltwell and Methwold Fen. A start was made in Feltwell Fen. First the drainage system had to be put in order and hard roads made; some hutments were put up and buildings to house machinery and manures. Then ploughing began and in due course crops of cereals were drilled and potatoes and sugar beet planted. The next problem was labour. A certain amount of labour was obtained locally and some lodged in the hutments. Then a prisoner of war camp was put up, some of the men being employed on the roads and some on the farms. This was an ambitious scheme, but a large quantity of food was produced, where nothing was growing previously.

After a time this land was all bought by Weasenham Farms Ltd. and the Committee then attacked other land in the district, some of which they still have in hand and are experimenting on. This Feltwell Fen is curious land, being chiefly peat up to 15 feet in depth. It grows very good green crops but the corns do not finish well, rye being the most promising—potatoes, sugar beet, carrots, celery, cabbages, all do well. There are now hard roads and the light railway joining the L. & N. Eastern Railway and worked by them so that all this heavy produce can be got away. This land no doubt has a good future for production of market garden stuff, and grazing for cattle as grass grows remarkably well. It is, however, essential that the drainage system be kept in order with the ditches properly cleansed. The Committee has also reclaimed land in Oxburgh Fen and in Eastmoor. More land was reclaimed in Wretton Stoke Ferry and Whittington by private enterprise and is now growing good crops where nothing had been produced for years.

Reclamation was also done on Massingham Heath: a stretch of about 500 acres partly used as a sheep walk, the rest being covered with bracken, thorn bushes, elder bushes, etc. After a tenancy agreement had been made between the owner (Major Birkbeck) and the Weasenham Farm Co., the latter set to work pulling up the bushes and ploughing in the bracken. Lime and fertilizers were put on and the corn sown. The results were excellent and very good crops were grown.

It was a glorious sight from the high ground looking over so many acres of beautiful corn. Many other bracken-covered lands were ploughed up and have grown good crops.

The Dersingham Marshes had been under grass since they were reclaimed from the Wash. The dykes were just the old creeks left by the sea, twisting and turning in all directions and the only drainage was by gravitation into the Ingot river. This land was found to be very good, but the drainage had to be improved first, and a pump and engine were erected. In addition a pump and engine were hired from the Great Ouse Catchment Board. These two pumps have worked well on the whole but a new and bigger pump is being installed in place of the hired pump. These two pumps should be able to control the water, whatever the rainfall, especially as the Ingol diversion scheme now being carried out should take a great deal of the upland water by gravitation. In the meantime the owners were consulted and finally agreed to a scheme to cut new straight ditches and fill in the old creeks, which has greatly facilitated the cultivations. A concrete road has been made so that heavy crops of potatoes, corn, etc., can be carted off. Now a somewhat similar scheme is being carried out in the Snettisham marshes. Much grass too has been ploughed up on the North Wootton marshes on the Castle Rising estate and excellent crops are being grown there. A lot of grass has been ploughed up on the Sandringham estate between the high land and the sea.

Another reclamation was the land in Waxham and Palling between the New Cut and Hickling, where reeds grew to six feet. Drainage again was the first item on the programme. In conjunction with the Committee Mr. H. Neave of Catfield tackled this land, which had no doubt been cultivated at some period. After the reeds had been burnt, the land was ploughed and eventually grass was sown. A concrete road was built, milking bails were erected and now the land carries many cows. Some siloes were erected to take the grass which grew too fast for the cows. Some corn too is now being grown.

The Commons were not forgotten. Some of them did not look very hopeful propositions but the undefeated Norfolk farmers tackled them with a will, helped by the Committee. Ridlington was tackled by Mr. Cargill, Thwaite by Mr Scott—

a big scheme involving much drainage and removal of trees and gorse which resulted in a wonderful crop of oats. Hanworth common and Roughton Heath were also ploughed up. Wacton Common has been taken on by the Committee and part is ploughed and more scheduled. Some under draining had to be done here and more is required but eventually the grazing should be much improved.

In South Norfolk there was much heavy land badly bushed in the Hempnall district : the hedges were very big and the ditches all full up. With the wonderful machinery available to-day the bushes were all pulled up, and the ditches cleaned out, after the fences had been cut down. The land was ploughed, lime and artificials applied and wheat was drilled. The 90 odd acres of wheat in one block was a grand sight. The crop was combined and yielded up to 17 coombs per acre and is again drilled with wheat. Some adjoining lands are now being cleared, but access is very bad and a hard road is wanted.

Then there were the Parks, most of which had been under grass for many years and they too have done their share of food production. The soil was deficient in phosphates in most cases and considerable dressings of lime were required. The landlords were ready to co-operate and in some instances they did the work themselves, in others the tenants. His Majesty the King was a willing plougher. Sandringham, Holkham, Blickling, Melton Constable, Elmham, Felbrigge, Gunton, Barningham, Beeston St. Andrew, Beeston St. Laurence, Belaugh, Sheringham and others all played their part and the resulting crops astonished many people. Stradsett gave a good example of the benefit obtained by direct reseeding, and much improved grazing was the result.

A good deal of direct reseeding has been done on marshes adjoining the rivers, Mr. James Alston of Calthorpe being one of the pioneers. Land which had been growing rushes and poor grass was transformed into very good grazing and in some places quite good crops of potatoes have been grown on these riverside marshes, especially near Elmham. The drainage had to be improved first and this applies in many places, since water is a good servant but a bad master.

A section of Acle marshes was experimented upon. Drainage here has been difficult, and some failures were attributed to the drainage not being put properly in order first. However, some very good crops of wheat and potatoes have been gathered, and at a time when every possible production was necessary. After rain access is very difficult and a hard road would be helpful. A lot of under-draining is required, since water stands on the land after rain. It is probable that this land will return to grass after a time. I am hoping that some experiments may be carried out in this district of controlled grazing and application of fertilizers. There is quite a possibility that the stock carrying capacity may be increased. During the war the laying down of grass for longer periods than one year has been discouraged as crops of cereals, potatoes, and sugar beet were more necessary. When the food position becomes less strained, a lot of land that has grown several cereal crops will require a rest and 3 or 4 year layers can provide this as long as the land is properly fertilised and properly grazed. The amount of keep a really well-farmed lay can put out is colossal and land in grass requires just as much attention as arable to obtain the best results.

The Woodton Hall farm of about 400 acres was taken over by the Committee. It was all poor grass, with huge fences, ditches all full up and stock could range all over it. The fences were cut down, the ditches cleaned out, the land ploughed and fertilized. It was decided to make it a training centre for Women's Land Army girls in milking and some fields were laid to grass, and some Ayrshire cattle purchased. The buildings required a lot of alteration and one of the chief drawbacks was the fact that there were no cottages attached to the farm. The farm house was made a hostel. I think the Committee will shortly return this farm to the owner and in the meantime a good example has been given of what that land can produce.

The various sections of the War Agricultural Committee were controlled by Sub-Committees, each with its senior officer and staff. The Drainage Sub-Committee had hundreds of schemes to draw up and investigate and bring before the Executive Committee to pass so as to obtain the government grant.

Actually 7,355 schemes were scheduled of which 1,275 were for tile draining, 255 for mole draining, and 5,825 for ditch cleansing, benefiting some 161,000 acres. The Horticultural Sub-Committee had a great deal of running about inspecting innumerable small properties, giving advice and reclaiming derelict orchards. They also are running a scheme for spraying orchards and have done many by contract. In addition they control the amount of land allowed for production of flowers. The Labour Sub-Committee had to deal with applications for release from the Forces. the distribution of labour from hostels, prisoner of war camps, and the provision of hostels for Women's Land Army, and many other things. The Women's Land Army Executive were in close touch with this Sub-Committee. The Pests Sub-Committee had rabbits, rats and other vermin to deal with. They have contracted to kill rats for 2,905 farmers over an area of 873,440 acres. Also they kill a great many rabbits. The chief difficulty has been to get enough men who knew their job. The Live Stock Sub-Committee and the Milk Production Sub-Committee deal with the Live Stock side. The Technical Development Sub-Committee deal with Agricultural Education and keep in touch with the latest advances in science as applied to Agriculture. A Sub-Committee has been set up for training Service men in Agriculture. The Feeding Stuffs and Manure distribution has been a very big business. The scheme devised by Dr. Sneddon, the chief officer in this department, has been adopted by the Ministry as the model for the whole country. As there are about 13,000 farmers none of whom can purchase feeding stuffs or manures without a permit, this office was kept very busy.

Many thousands of pounds worth of machinery are in the hands of the Committee, not only to work the lands taken over by the Committee but also to do work for farmers on contract. All this has required large sums and the Finance Department has a full-time job, with money to be found each week for labour, separate accounts to be kept of every scheme, and funds advanced to farmers to be collected in due course.

I have tried to give a brief outline of some of the things that Norfolk has been able to do to assist in winning the war. The sum total of her production is enormous. It was brought about by the grand co-operation of the members of the Executive Committee, the members of the 15 Sub-Committees, the splendid work of the Staff for whom no day was too long, and the whole-hearted support of the farmers. The labourers too have done their part in achieving this magnificent result. I only hope that the nation will realize their debt to Agriculture and never again allow it to return to the "Slough of Despond" as after the last war.

IV

RECLAIMED LANDS OF WEST NORFOLK

By C. P. Petch, M.B., M.R.C.P.

During the past hundred years a very considerable area of land has been added to the county of Norfolk along the Eastern shore of the Wash and the vegetational changes that have ensued are of some interest to naturalists. The modern era of land reclamation here can be said to have begun in 1852 with the diversion of the River Ouse to the Marsh Cut, and to have continued at intervals until 1933. The land falls naturally into three categories—

1. Salt Marsh
2. Modern reclamations, since 1852
3. Ancient reclamations, still known as marshes, but hardly meriting the name.

Salt Marsh

The salt marsh vegetation is typical of muddy estuaries. Until recently, the pioneer plants were *Salicornia*, *Suæda maritima*, and *Aster Tripolium*, giving place to a close turf of *Glyceria maritima* with lines of *Atriplex portulacoides* along the banks of creeks. The introduction of the Cord Grass (*Spartina townsendi*) however, has made a big difference in its aspect. In 1925 this plant existed on the banks of the Cut, and in a few small patches at Wolferton. To-day it lines the whole of the foreshore, and has, in a pure state, colonised large areas of what was formerly bare mud between North Wootton and Wolferton.

The Glyceria community affords grazing for large numbers of sheep, and no further development takes place until it has built up sufficiently for enclosure. The dominant plants of the later stages of more sandy marshes—*Limonium* and *Armeria*—are not found here, and the natural succession, whatever it may be, is prevented by the grazing. *Cochlearia officinalis* is the only other species occurring in significant numbers, and it is not frequent.

Modern Reclamations

The most striking feature of these lands is the rapidity with which the salt marsh species disappear. Within a year or two of the exclusion of salt water, they have been replaced by the common pasture grasses, and the docks, nettles, thistles, buttercups, and daisies of arable fields. Until 1942 most of the modern reclaimed land was pasture, but since that date much of it has been ploughed up, and, I am told, produces excellent crops. The saline influence, however, still shows in the drainage ditches, whose flora is in marked contrast to those of the ancient reclamations. In a ditch in the 1904 reclamation, for instance, not containing standing water, *Glyceria maritima* was still in 1945 the dominant plant. Deeper drains in the same area, with permanent water, were dominated by *Ruppia rostellata*, with a marginal fringe of *Scirpus maritimus* and *Juncus gerardi*—all species associated with brackish water. Even in the 1865 reclamation, 80 years after the sea had been cut off from it, a large pond was fringed by *Scirpus maritimus*, *Glyceria maritima*, *Aster tripolium* and *Spergularia salina*. The open water here contained *Myriophyllum spicatum* and *Potamogeton pectinatus*, but not *Ruppia*. Where there is an influx of fresh water from streams draining the " upland," fresh water aquatics begin to appear, but the slowness with which they do so indicates that these plants do not have naturally a rapid rate of spread. For example, a fresh water stream whose seaward end was included in the 1927 reclamation had in 1944 only four such species in the reclaimed stretch—*Alisma plantago-aquatica*, *Apium nodiflorum*, *A. graveolens*, and *Digraphis arundinacea*—as opposed to the forty odd that might have spread from its upper reaches in these sixteen years. Similarly, a deep channel cut for fresh water in 1866 had in 1945 only *Potamogeton prælongus*, *P. pectinatus*, *P. densus*, *P. crispus*, *Ranunculus fluitans*, *R. circinatus*, *Elodea canadensis*, *Myosotis palustris*, and *Apium nodiflorum*.

Three arable weeds are typical of this reclaimed land and are not common on the " upland " fields—*Caucalis nodosa*, *Geranium dissectum*, and *Coronopus ruellii*. This is probably due to the fact that they prefer a heavier soil than is frequent in West Norfolk. Similarly *Senecio erucifolius*, *Dipsacus*

sylvestris, and *Conium maculatum* are more frequent on the old sea walls than further inland. *Carum segetum* is an uncommon weed that turns up regularly in such situations. The most recent sea wall—that actually keeping out the sea—is covered with *Agropyron repens* and *Hordeum marinum*, with occasional *Artemesia maritima*.

Ancient Reclamations

These were until 1942 entirely pasture, but are now largely arable. Certain plants which have not spread to the modern reclamations are common, e.g. *Conopodium denudatum*, but the orchids, which are such a charming feature of the "upland" meadows, are not found. A particularly characteristic and abundant plant in the wetter parts of these old reclaimed lands is *Carex divisa*, which forms in places an extensive sward. This is a species which is never found remote from the sea, but the factors that govern its distribution are difficult to understand, since it is well beyond the influence of brackish water, and never approaches the actual foreshore. Among the aquatics, *Oenanthe lachenalii* has similar preferences.

The drainage ditches of these ancient marshlands have a rich aquatic flora, arising partly from their age and partly from the fact that they are wide and meandering, not straight and scientifically cut as in the modern versions. They are in fact frequently adaptations of former salt marsh creeks, whose winding habits are well known. The flora shows that the process of washing out salt from the soil must here be complete. In ditches with permanent water are found :—

Alisma plantago-aquatica	f	*Potamogeton natans* ...	f
Butomus umbellatus ...	a	*P. crispus*	o
Carex riparia	r	*P. alpinus*	lf
Chara spp.	la	*Ranunculus circinatus* ...	f
Callitriche obtusangula ...	r	*R. trichophyllus* ...	f
Elodea canadensis ...	la	*R. peltatus*	r
Hydrocharis morsus-ranæ	a	*Rumex hydrolapathum*	vr
Lemna minor	o	*Sagittaria sagittifolia* ...	a
L. trisulca	o	*Scirpus lacustris* ...	r
L. gibba	r	*S. palustris*	o
L. polyrrhiza	r	*Sium angustifolium* ...	o
Oenanthe lachenalii ...	vr	*Sparganium ramosum* ...	o
O. aquatica	o	*S. simplex*	r
Phragmites communis ...	r	*Typha angustifolia* ...	vr

Along the margins of these, and in ditches drying in the summer :—

Alopecurus geniculatus ...	a	*Myosotis palustris* ...	f
Apium nodiflorum ...	o	*Nasturtium officinale* ...	f
Carex vulpina	f	*Oenanthe fistulosa* ...	f
C. remota	o	*Ranunculus sceleratus* ...	f
C. axillaris	vr	*Rumex glomeratus* ...	r
Digraphis arundinacea ...	r	*Veronica anagallis-aquatica*	r
Glyceria fluitans... ...	a	*V. beccabunga*	o
G. aquatica	r	*Samolus valerandi* ...	r
Galium palustre ...	f		

These ditches are periodically cleaned out, and in the year immediately after such cleaning the free floating aquatics, such as frogbit and the duckweeds, dominate the picture. In the next year the taller species such as *Butomus*, *Sagittaria*, and *Sparganium* begin to establish their ascendancy, and in a few years the frogbit has become a rare plant, so to remain until the next clearance. With the conversion of much of the pasture to arable, some of the ditches have been straightened and improved. This has caused the disappearance of *Oenanthe lachenalii*, which was never widely distributed, but I have no doubt that it will reappear in time. The hybrid *Carex axillaris* (*C. vulpina* x *C. remota*) on the other hand persists in the locality in which I have known it for twenty years, growing among its parents.

V

WILD BIRD PROTECTION IN NORFOLK IN 1945

Report of the Council

The Council of the Norfolk Naturalists Trust has much pleasure in presenting to members its bird protection report and news for 1945. It wishes once again to thank all the subscribers to this branch of the Trust's work who so generously contribute to its funds year by year. Without this regular annual help it would be impossible to maintain the keepers necessary for the control of its nature reserves.

It is appropriate that in this year of victory two new properties have been added to those already held—Barton Broad with the adjoining wood at its southern end known as the Heron Carr, and the Whiteslea estate of the late Lord Desborough which includes much of Hickling Broad and its surrounding marshes. Barton, through which flows the river Ant, is one of the most beautiful of the Broads. Bitterns nest regularly in its reed-beds and from time to time bearded tits are seen there too. The south end and the wood adjoining it have come to the Trust as a gift from Capt. C. B. Wilson in memory of his son ; the rest has been purchased to round off the property. Hickling has long been famous as a nature reserve during the time it has been so ably managed by the late Jim Vincent.

It is the Council's intention to carry on as far as possible in the same way and Mr. E. Piggin, who worked under Jim Vincent for fifteen years, has been appointed Head Keeper. The accompanying photograph shows him in his punt at the edge of the Broad. We are indebted to the Editor of the *Eastern Daily Press* for permission to reproduce this ; also to Captain George Yeats for so kindly lending his photographs of the wood-warbler and black-winged stilts. The latter was not taken in this country, but as two pairs of these birds nested in Northamptonshire this summer, and others visited both Suffolk and Norfolk, it is most appropriate.

SCOLT HEAD ISLAND

There is very little of interest to report in regard to the birds of the Island which has now been in continual use as an

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The Eastern Daily Press

Hickling Broad

artillery range for four years. Chestney's visits there have to depend on the firing which often takes place on every day of the week. For this reason his notes are very brief.

During the winter there was the usual large flock of Brent geese in the harbour, and it is an interesting fact that these birds appear much more disturbed by low flying planes than other species.

On January 10th an immigration of fieldfares was noted and large numbers were seen flying in from the sea. This happened again on February 11th when both fieldfares and green plovers were arriving.

Of the breeding birds there were fewer Sandwich terns than have nested on the Island in recent years, and no doubt some of them moved to Blakeney Point where conditions at the beginning of the season were so much quieter.

In the following list the number of birds is an approximate estimate :—

Sandwich Tern	...	It was calculated that about 400 pairs nested in small colonies, one of which was on the beach and the rest in the dune area.
Common Tern	...	An estimate of 1,400 nests, about the usual number.
Little Tern ...	...	An estimate of 100 nests to the west of the Hut of which thirty-seven were on the shingle ridge under the Long Hill.
Roseate Tern	...	One pair nested within two yards of last year's site. The two eggs hatched and both chicks were reared.
Ringed Plover	...	The usual number.
Redshank ...	...	About the same number were noted at the west end of the Island where they could be observed.
Oyster-catcher	...	A total of forty-two nests counted.
Lapwing ...	...	These have been driven out of their usual nesting ground on the marshes east of the hut by gunfire.
Mallard ...	...	Five nests were found near the ternery.

Sheld-duck ... ... A lot of young birds were seen in the creeks but most of these probably came from the mainland. A number of adults are killed each year on the Island by gunfire when they are looking for nesting holes.

The following birds of passage were seen during the season :—

Black Tern. A number of these were noted from time to time between May 19th and September 24th, the largest party being eight birds on May 26th.

Black-tailed Godwit. A bird in full summer plumage was seen on the Cockle Bight on May 19th.

Marsh-harrier. A female was seen on June 19th flying along the golf course. Another was noted on July 8th.

Arctic Skuas. The first of these to arrive were four which were noted on July 3rd. Two of these were the light form. After this date they were seen frequently during the summer and early autumn chasing the terns.

Snow-Buntings. Three early arrivals were seen on September 21st.

Quail. On September 29th when Chestney was with a shooting party at Hunstanton five were flushed from a field of roots.

Bluethroat. One seen in the suæda bushes on October 19th when there was a marked movement of small birds which included common redstarts, robins and pied flycatchers, wrens and blackbirds.

BLAKENEY, CLEY AND SALTHOUSE

May to October, 1945.

We are indebted to Mr. and Mrs. R. F. Meiklejohn for the following notes, the first consecutive observations in this area which have been made for several years.

The results of daily observations made during this summer and autumn were not as good as might have been expected. Continual artillery practice and the intermittent blowing up of mines along this part of the coast were unfavourable factors for

bird watching, and during the autumn migration south-westerly winds prevailed with the exception of one or two short periods.

The following birds of passage are recorded in the order in which they were first seen.

Black Tern.—On May 20th fourteen were flying low over Blakeney golf course in the direction of Cley. Two were seen from the East Bank at Cley on August 31st, and two in winter plumage on September 26th.

Gadwall.—A pair was seen from the East Bank as they came in from the sea on May 29th.

Montagu's Harrier.—One seen quartering the marshes on May 21st.

Marsh-Harrier.—A female, first seen over the Cley marshes on June 29th, was there at frequent intervals until the first week in August.

Yellowshank.—On July 25th, when on the north end of the East Bank, we saw a wader with bright lemon-yellow legs and watched it at a distance of about fifty yards through field-glasses for some minutes. It then flew close by over the bank and dropped into the reeds but, as we prepared to follow it, a mine exploding a quarter of a mile away cleared every bird from the marsh, and we did not see it again. It was not possible to say whether it was a greater or a lesser yellowshank and so no official record could be made.

Black-tailed Godwit.—These appeared in unusually large numbers on the Salthouse marshes at the beginning of August.

Greenshank.—Several were seen passing through in August and one on September 2nd.

Dusky Redshank.—One was seen from the East Bank on August 31st and two on September 2nd.

Wood Sandpiper.—One seen from the East Bank on August 31st and several were on a pool on the Cley marsh on September 2nd.

Little Bunting.—A close view was had of this bird in the bushes near the Watch House on the Blakeney Point ridge on September 5th, and again on the 6th and the 10th. It was also seen by Mr. A. Daukes.

Pied Flycatcher.—Several were seen with other small migrants on September 10th.

Norfolk Plover.—On September 17th two were seen on the Salthouse marsh with an unusually large number of waders which included black-tailed and bar-tailed godwits, knot, and a big flock of wigeon.

Little Gull.—One, in winter plumage, was seen from the East Bank on September 26th and three on the 28th. A very high tide had been forced up by the strong N.W. wind and the whole marsh was flooded at the time.

Peregrine Falcon.—One seen on September 28th.

Greenland Wheatear.—Two identified near the Watch House on the Blakeney Point ridge on October 8th.

Little Auk.—Six seen on October 8th flying westward low over the sea.

Breeding Birds on the Cley Marsh

Bittern.—From observations made during the season it was estimated that at least three pairs nested here. They were heard booming by Chestney from April 12th and were frequently seen flying over the marshes. On one occasion half-grown young were seen being fed by the parents.

Garganey Teal.—Two pairs were seen by Chestney on April 26th and on June 13th he saw a brood of nine young on the marshes.

Blakeney Point

A large colony of Sandwich terns nested this year. On May 23rd Chestney estimated that there were at least a thousand nests but they were spread over a large area and it was not possible to count them. He also saw and heard a roseate tern on the same day but there was no evidence of a nest at any later date.

It was unfortunate that the ban on visitors to the Point was lifted at the beginning of the breeding season while Ted Eales was still away in the Navy, and there is no doubt that many nests were robbed of their eggs for domestic use.

BIRD NOTES FROM HORSEY

By Major A. Buxton

The summer of 1945 proved more interesting than the previous one in regard to the birds at Horsey although there were some disappointments. These I will relate first.

There was a fair number of bearded tits round the Mere during the winter and two pairs settled down early in April and the nest of one of these pairs was found. The hen was seen to take the feathery head of a reed to a particular spot and we waited in vain for further visits to give us the exact position, but as nothing more happened I went up to try and find the nest on the line we had. The cock got up from the eggs at my feet so that presumably the hen had given him the reed-head to play with during his spell of incubation. They hatched successfully but a week of north-west gales forced the water up so high that all the young were drowned in the nest. This spell of high water was disastrous, not only to the bearded tits but also to water rails, pheasants and, no doubt, to other birds. It was disappointing to have only two pairs of bearded tits nesting and I suspect that the hard frost in January, combined with the shortage of cutters to provide the cut reeds from which the birds could extract grubs, was responsible for the small number of birds in the spring.

It was a very poor year for bitterns probably accounted for by the hard frost, for I heard of two in dire distress during that period. One walked into a cottage at Wroxham and the lady of the house, not liking the look of its bill, tied it up with string. She afterwards relented and saved its life by feeding it on a tin of sardines. Another bittern entered the cottage at Lambridge Mill, Waxham, but the bird died two days later. There were three booming bitterns in or about Starch Grass and one at the west end of Horsey Mere, which represents about one third of the normal stock. One nest was found from which three young were reared. Dr. Kock took a record of a bittern booming in Starch Grass. His first attempt at the west end of the Mere was a failure due to interruptions from aeroplanes, a mooing cow and a grasshopper warbler. The latter apparently sat practically on the top of the microphone and " reeled " into it.

Four pairs of marsh-harriers arrived later than usual and, after manœuvring for territory, two pairs remained having successfully pushed out the other two. One pair which nested in Brayden gave much pleasure. They were thoroughly efficient, laid five eggs and reared a splendid brood of five. The hen was unusually handsome, of a fine red-brown colour with large white patches on head and shoulders. The cock's appearance was nothing to write home about, but he knew his job and brought in kill after kill with praiseworth regularity. The great attraction of these birds however was their " passing." Unlike most marsh harriers, who make most of their passes on the ground, this pair performed well up in the air. I remember one pass in particular : the cock came in high, and when the hen went up to meet him he rose higher still and forced her to chase him ; then he closed his wings and dropped towards the ground, but she swooped still faster and checking herself when in position below him took the pass. One pair of Montagu's nested and reared three young from a clutch of five eggs. If the cock had been more efficient and less vague and lazy in catching prey they would, I think, have reared all five.

Owing no doubt to a lack of short-tailed voles, all the short-eared and long-eared owls, which had appeared in March and April, passed on and none remained to breed. A pair of barn owls, which nested in the roof of a deserted house, hunted the marshes and brought in a varied assortment of rats and mice. My marshman, Mr. A. Dove, saw a little owl plane down from a dead tree on to a field and, as it alighted, a French partridge attacked it and knocked it over. The owl rose, but the partridge rose higher and knocked it over in the air, after which it fled for covert still pursued by the partridge. A brood of fourteen chicks were then seen running in line over the field after their mother.

On May 27th I saw a hobby circling over the Mere and afterwards flying towards Heigham Sounds. It returned soon afterwards and was again seen by Mr. Dove two days later, but after that we saw no more of it.

The main feature of the garden this summer was the number of wood-pigeons and turtle-doves that bred in it. The cooing

during the summer was almost continuous, so much so that one almost ceased to hear it. There was a good show of blackcaps, garden warblers and common whitethroats but for some reason no lesser whitethroats, nor were there any in the neighbourhood. It was a good year for sedge, reed and grasshopper warblers.

There were no red-backed shrikes along the fence they usually frequent.

On May 9th, the earliest date I remember for a golden oriole, a cock bird arrived in the garden and visited it on a number of occasions during the next ten days. He was an extremely poor whistler.

There were several pairs of garganey at Horsey this summer but no teal or shoveler seem, as yet, able to breed east of the Hickling—Horsey boundary, no doubt owing to the effects of the flood of 1938.

In most seasons whimbrel, which pass through in great numbers in May, do not alight on our marshes in any quantity, but this summer there was some food which evidently attracted them and they stayed whistling and bubbling in large numbers. They selected the same marshes as the curlew, which appeared in the early autumn, and I have reason to believe that leather-jackets were the attraction.

Considerable numbers of spotted crake were heard round the Mere at the end of October.

Normally we have great quantities of great black-backed gulls resting on Horsey Mere during the herring fishing period. They do not seem to have realized that the herring fishing has started again from Norfolk, and may perhaps have found, during the war, other resorts where good food can be obtained with ease. Visitors to Yarmouth this autumn have also noticed the absence of gulls on the quay at unloading time. In pre-war days black-backs and herring gulls accompanied every drifter into port and were always to be seen standing on the roofs of the packing sheds. At night many would fly on to Breydon to wash and rest and these appear to be far fewer now.

NOTES FROM HICKLING

By E. Piggin

Bearded Tits.—The season began badly for the bearded tits with the sharp spell which set in on Christmas Eve and continued through most of January. These little birds are able to stand frost but snow affects them badly because it covers the reeds from which they obtain their food supply. Moreover there were heavy falls of snow again in April during a cold spell which interrupted the unusually warm and early spring. This snow came when many birds were breeding and numbers were drowned in their nests. However in spite of this set-back the bearded tits had a more successful breeding season than could have been hoped for in the circumstances, and eleven nests were found in which the young were reared. As a result this autumn of 1945 shows a fairly good stock again.

Bitterns.—A few died of starvation at the beginning of the year but in spite of this bitterns are increasing in numbers and are spreading to all the suitable places in Norfolk and further afield.

Water Rails.—These were very scarce in the breeding season but there are more about this autumn.

Grasshopper Warblers.—At least four pairs nested at Hickling.

Garganey Teal.—Three nests were found, but none of the Common Teal.

Shoveler.—These duck fared badly in the heavy rain of April and May and nineteen nests were flooded out.

The following birds of passage were noted by Mr. Piggin and by visitors to Hickling during the spring and autumn :—

Common Crane.—One on Dreary's marsh on April 24th and 25th.

Osprey.—The first bird of the season was seen from Whiteslea Lodge on May 13th. It stayed in the district for a fortnight during which time it was seen catching fish in the Broad. Another osprey was seen perched on one of the stakes in the Broad on July 1st, a day of heavy thunder-storms. This bird flew off as it was approached by the punt and was not seen again.

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Wood Wren

Black Tern.—Two hawking over the Broad on May 21st.

Ruff and Reeve.—Three seen on May 21st and two on August 20th.

Slavonian Grebe.—One identified on August 27th.

Sea Eagle.—An adult bird with a white tail was first seen on October 25th and during the following four days. Nearly all the previous records for this district have been of immature birds.

Glossy Ibis.—Six of these rare visitors were first seen flying in at dusk on the evening of October 25th. They appeared to find abundant food on the marshes which are constantly grazed by cattle, and remained until November 7th. These birds flew in perfect formation, both line ahead and line abreast, and were a grand sight with their broad wings appearing to be almost wing-tip to wing-tip. Two Ibis were still at Hickling on November 26th.

BREYDON WATER AND YARE VALLEY NOTES

By Peter Browne and Michael Seago

Hooded Crow.—First autumn bird seen October 14th ; the majority from October 21st.

Mealy Redpoll.—At least four birds of this species were noted amongst a party of twenty lesser redpolls at Yarmouth on November 5th.

British Twite.—Parties up to about fifty from October 28th.

Snow Bunting.—Two on September 26th and 27th, one from October 20th, large parties from November 2nd.

Shore Lark.—One or two on north Breydon wall on Oct. 21st.

Rock Pipit.—Fairly numerous from November 2nd.

Red-backed Shrike.—One pair bred at Reedham 1944 and 1945.

Reed Warbler.—Straggler noted on Cantley reservoir October 2nd to 4th.

Wheatear.—First spring migrant noted April 15th, a late bird on June 24th, and autumn migrants noted from August 13th to September 29th. A straggler present at Breydon October 30th.

Greenland Wheatear.—Definitely identified September 9th and 18th, and probables on September 23rd and October 27th to 30th.

Whinchat.—Birds seen on passage August 25th, September 5th and 21st.

Long-eared Owl.—One pair bred in disused Heron's nest in the Wickhampton heronry.

Common Buzzard.—Single birds seen at Cantley August 21st and October 5th, and over Breydon September 18th.

Montagu's Harrier.—One adult male at Cantley reservoir August 15th, and one female on Breydon October 20th.

Hen Harrier.—One adult male hunting over a Breydon rond November 3rd.

Herons.—Forty-eight nests occupied in Wigg's carr, Wickhampton, at the end of March—twice the number counted last year. The old well-known heronry at Reedham a mile away is now quite deserted.

Bittern.—Single birds seen at Rockland Broad October 31st, and on a Breydon rond on November 3rd and 7th.

Bewick's Swan.—Party of ten seen on the flooded marshes at Postwick on February 26th, five remained until March 7th.

Grey Lag-Goose.—Three seen October 7th, and seven on October 17th.

Pink-footed Geese.—Fairly large flocks on the marshes between Halvergate and Breydon from October 13th.

Sheld-duck.—At least nine juveniles with adult female on Cantley reservoir during June. Several broods were noted on Breydon during July and August. The winter birds in flocks up to fifty are now arriving.

Wigeon.—First autumn arrivals seen August 24th, very early, during September and October the numbers gradually increased.

Pintail.—Up to April 18th small parties up to twelve strong seen on passage, first autumn birds—two to four in number—seen on September 28th to October 6th ; also a pair on Oct. 28th.

Shoveler.—Several pairs on passage early in April, the drakes were in beautiful plumage. One pair bred at Cantley reservoir as usual. Up to four seen on Breydon from October 28th.

Pochard.—First autumn arrival at Breydon on Nov. 3rd.

Scaup.—One adult female seen October 21st, joined by two

juveniles on 28th, increasing to ten on November 2nd and up to fifteen on November 3rd and 7th.

Goldeneye.—Juvenile birds seen on Rockland Broad October 31st and November 4th and at Breydon on November 7th.

Red-throated Diver.—One on estuary on April 13th.

Great Crested Grebe.—Party of five floating down the Channel on August 12th, and a single bird on August 22nd.

Slavonian Grebe.—An immature bird seen on October 14th and remained there until it was unfortunately shot on Oct. 21st.

Red-necked Grebe.—An adult on Rockland Broad on Nov. 25th.

Peregrine Falcon.—A bird of the year seen on September 29th by G. Robinson.

Bar-tailed Godwit.—First autumn birds arrived in August 10th, and parties of them up to twelve strong were continually seen during September and October, three are still present on November 7th, which is one of the latest dates for this estuary. as they do not winter here. The majority were juvenile, although one adult in full breeding plumage was seen in September.

Black-tailed Godwit.—Numbers of this very fine wader passed through. In the spring a pair were seen on April 16th, and the first autumn bird, still in full breeding plumage arrived on July 29th (P. Kirby). Two more were identified on September 9th after which two or three were noted on every visit until October 21st. Another adult which was first seen on October 30th was still there on November 7th. This is the latest record for Norfolk.

Curlew.—Autumn passage began as early as the third week of June, and throughout the autumn packs up to one hundred and seventy strong were to be seen.

Whimbrel.—Four flew over Reedham on June 23rd, on Breydon passage lasted from July 8th to September 23rd.

Jack Snipe.—First one reported at Reedham about October 7th. At Breydon we saw one on October 30th, three on November 3rd and 7th.

Turnstone.—First autumn bird seen July 8th, and small parties passed through during August and early September.

Knot.—Between July 15th and August 2nd several adult birds in the beautiful red plumage were noted, with a maximum

of eleven. Throughout September and October we saw numbers passing through, the majority being juveniles.

Dunlin.—The main passage began on July 18th and throughout the autumn varying numbers passed through, most of the early arrivals were adults, but the proportion decreased during early August, until nearly all were juveniles by early September.

Curlew Sandpiper.—Small parties of adults in full breeding plumage seen between July 21st and August 16th. The first juveniles appeared on August 16th after which small numbers were noted till September 23rd. There was also a juvenile at Cantley on August 21st and 23rd.

Little Stint.—One adult seen on July 19th.

Sanderling.—Very few identified during the autumn.

Ruff.—All records are of juveniles, firstly one at Cantley on August 31st. At Breydon there were seven on September 9th, one on 18th and 20th, three on 21st, five on 23rd, three on 29th and 30th September ; also a late bird on October 30th which is one of the latest records for Norfolk. These birds seemed to show some preference for weedy or sheltered patches of mud, but several were noted feeding on the open flats with redshanks and godwits, etc. Three were also shot on a flooded marsh at Reedham on September 29th.

Common Sandpiper.—The autumn migration lasted from June 29th to October 7th reaching a total of forty-five birds on August 11th and 12th. A very late bird, and the latest ever recorded for the area, was noted on November 3rd.

Wood Sandpiper.—Single birds at Cantley on August 19th and 31st and also September 2nd.

Green Sandpiper.—At Cantley the first arrived on June 24th, and, with a maximum of fifteen they passed through until September 17th. A late bird was seen on the river at Reedham on October 30th, whilst at Breydon a total of nine, including a party of four were seen between July 29th and August 26th.

Spotted Redshank.—Single birds identified on September 1st, 5th, 6th, 15th, and 29th, on October 14th, 21st and 30th, and on November 2nd, 3rd and 7th. One was also seen on April 15th.

Greenshank.—First one recorded in autumn on July 15th. Between August 19th and October 21st small parties up to seven seen.

Golden Plover.—First autumn bird, still in faded breeding plumage, seen on August 22nd, and many small parties, up to thirty-three, were seen during the autumn.

Grey Plover.—Single beautiful black breasted adults seen on August 2nd, 19th, 22nd, 24th, 26th and 28th, and a very late bird to be still in full summer plumage on October 21st. The first juveniles arrived on September 5th, and increased up to about forty at the end of October.

British Oyster-catcher.—Up to five seen during the autumn, the last on October 28th. One pair bred on one of the adjacent marshes (H. Davies).

Black-headed Gull.—On April 6th, between five and six hundred birds were present at Cantley reservoir. It appears that these all bred as it was reported that over one thousand eggs were taken during the summer. Observations at the end of June indicated that only about ten pairs were successful in rearing broods.

Common and Lesser Tern.—Both species watched fishing in the Channel and drains during the autumn. Common remaining till September 5th, whilst Little were seen from the third week in June to September 5th.

Scandinavian Lesser Black-backed Gull.—Five adults identified on November 3rd and three on November 4th on Breydon, G. Robinson and ourselves all saw the dark mantles and small size, and the yellow legs.

Arctic Skua.—A juvenile was seen on Breydon on September 14th.

Quail.—One flushed from a path through a stubble field at the Whitlingham Sewage Farm on September 13th. Incidentally a number of Green and Common Sandpipers were seen here during the early autumn.

NOTES ON A PAIR OF CHIFFCHAFFS

By B. B. Riviere

In my garden are three bushes of butcher's broom in each of which in turn, during the past three seasons, a pair of chiffchaffs have nested. In 1943 and 1944 the bush was shared, curiously enough, with a pair of hedge sparrows, the

two nests in 1944 being less than a foot apart. This year the chiffchaffs had the bush to themselves.

The male was first heard singing on April 1st. When the female arrived is not certain, but she began to build on April 20th. On April 28th feathers for the lining were being taken in and on the 30th the first egg was laid. From start to finish therefore the nest took ten days to build. The cock did not accompany the hen while she was building and indeed appeared to take no interest in the proceedings whatsoever, but he sang persistently throughout the day. On May 6th the nest contained six eggs on which the hen was brooding. These were unhatched on the evening of May 18th ; but on the 19th at 10 a.m., five chicks were out leaving one addled egg, thus making the incubation period thirteen days.

The cock, who up to this time had seemed entirely oblivious of the fact that he had a nest at all, finally revealed himself as surely the laziest, most self-indulgent and undomesticated of all small birds ! He sang persistently throughout the whole fledging period of the brood, and until they were three days old was never seen near the nest. After that he very occasionally appeared with a green caterpillar in his bill—often singing at the same time—but immediately he was aware of being watched he made this an excuse for swallowing it himself. All the feeding during the first two days, and nearly all thereafter, was done by the hen. Through being so constantly under observation she became extraordinarily tame and would feed the chicks while one was close up against the bush, and it was very good value to watch this fairy-like little creature attending to her domestic duties only a couple of feet from one's face. For the first two days she brooded the chicks for longer periods than she fed them, but each day the periods of brooding became shorter. Often when brooding, and particularly if the chicks moved under her, she would stand up and look down upon them for a moment or two, as if to make sure that all was right with them. Green caterpillars and bunches of green fly seemed to be the staple diet, and the intervals between feeds varied from two to fifteen minutes. It was difficult to see whether the food was ever distributed amongst several young ones because the hen's back was usually turned towards one. On one or two occasions I thought that this was done

but, in every instance where I had a really clear view, the whole beakful, however large, was placed in the open mouth of one chick only; nor could I see by what method, if any, she decided which young one to feed. She appeared to fill any mouth at random, though the nestling last fed was seldom an applicant next time, or in any case not a very eager one. So far as I could discover, the young ones never changed their places in the nest, and as all grew and feathered equally those at the back of the nest must have got their fair share of food. A remarkable fact was that, even when only a few days old, the young always seemed to be aware of the parent bird's approach, and immediately on her arrival at the bush all their beaks would open. This was not due to the call note, which, on account of my presence, was frequently uttered whenever she was near the nest, and of which they took no notice. It seemed difficult to believe that they could actually hear her arrival on the far side of the bush and her gradual, and apparently silent, passage through it to the nest which was her invariable method of approach, but there it was.

After each feed she would wait a moment for the last fed nestling to defoecate and, if it did so, the foecal sac was picked up and carried away in her bill. This was continued right up to time when the young left the nest which was completely unsoiled.

The young chiffchaffs' eyes were first seen to be open on May 24th when they were five days old, and they left the nest on the afternoon of June 2nd which gives a fledging period of between fourteen and fifteen days.

MISCELLANEOUS NOTES

Hawfinch

A pair nested and reared young in a garden at Coltishall. Another pair was seen frequently during April and May by Capt. G. Yeats and once by me, on Mousehold Heath. (B.B.R.).

Mealy Redpoll

A single bird with lesser redpolls seen at Cringleford on November 10th and 11th. (G. F. B. Robinson.)

Coue's Redpoll

A bird believed to be of this species was seen by Commander and Mrs. C. E. Hamond on Stiffkey Greens on November 3rd.

Although the light was failing the white rump was conspicuous as it rose from the seed-heads of Artemesia Maritima. It alighted again a short distance away and was then approached within a few feet and the underparts and breast were also seen to be white.

On the following day the bird was again seen and in a much better light and, in checking the observations made previously, it was noted that the rump, breast and underparts were better described as off-white. The note was similar to that of a greenfinch but weaker. The bird was very small, no bigger than a lesser redpoll and from this it was judged to be a Coue's redpoll.

Woodchat Shrike

On July 1st at Hickling Miss C. E. Gay and I had the good fortune to see a woodchat shrike perched on the top of a bare bush at no more than ten yards distance. Later it was seen near the same place devouring a lizard. There appear to be only five previous records of this bird in Norfolk. (B.B.R.)

Waxwings

A party of eight were seen on November 9th in a wood of sweet chestnut and birch between North Walsham and Ridlington. They were quite tame and were approached sufficiently close for the crests and bright yellow on the tail to be clearly seen. (Miss Alison Clay.)

Willow Tit

One seen near Keswick Mill on November 15th. The bird's dull sooty head, pinkish buff flanks and pale edges to the secondaries were very noticeable and also its note. (G. F. B. Robinson.)

Wood Warbler

A pair reared young in a wood at Sprowston— a new locality for this bird in Norfolk. The nest was found by Capt. G. Yeats who had heard the bird singing in this wood in 1944. When seen by me the nearly fledged young were being fed on green caterpillars by both parents, sometimes as often as twice in one minute. They were very tame and allowed me to stand within five yards of the nest while feeding was going on. The wood is of young conifers with a few oak trees, with a dense carpet of pine needles and a little bracken. (B.B.R.).

BLUETHROAT

A bluethroat was seen in Mrs. Muster's garden at Morston on Friday, September 7th. (Major P. Hamond.)

SEA EAGLE

One was seen on April 18th by John and Michael Parker and by an army officer stationed nearby. The bird rose from a tree on an island in Didlington lake and flew off with slow rather laboured flapping of its immense wings, the width of which was particularly striking.

(An adult is reported by E. Piggin in his notes from Hickling)

OSPREY

An osprey was seen by Squadron-Leader John Barrett on September 20th flying eastward over the sea at a height of only about thirty feet and thirty yards from the shore. Every now and then it would turn into the west wind so giving a good view of both under and upper parts. There was less white on the head than that of a full-plumaged adult. At Hickling an osprey was seen on April 12th and July 1st and another at Woodbastwick on August 3rd. (B.B.R.).

COMMON POCHARD

The pochard is sufficiently rare as a breeding species in the eastern side of the County to warrant recording that Mr. T. Blofeld saw a duck with a brood of small young ones on Hoveton Big Broad in June. For several years I have seen pochard throughout the summer at Woodbastwick but could obtain no direct evidence of their breeding. (B.B.R.).

SMEW

An adult drake was seen by John Parker on Didlington Lake or on the river Wissey on January 11th, 12th and 17th.

On Holkham Lake on February 6th there were four smew, two white adult males and two red-headed birds. (C.E.G.).

HERON

On the afternoon of August 3rd a flock of seventeen herons were seen flying along the coast line between Salthouse and Cley. They were flying in as close formation as do herring and black-backed gulls which, in the distance they were at first thought to be. Eventually they all turned South and after

circling round for a time the flock split up into ones and twos which proceeded inland in different directions. I have never before seen herons flying as these were in a compact flock and one wonders whether this was a migration from overseas. (B.B.R.).

SPOONBILL

A spoonbill was seen by Edwin Vincent at Hickling on May 31st. There have been very few records of this bird in Norfolk during the war.

LITTLE BUSTARD

A bird believed to be a little bustard was seen by Brigadier Martin in the " battle area " at Stanford. The white on the neck was very pronounced.

It is many years since a bird of this species visited Norfolk, the last recorded being in 1916. (" The Birds of Norfolk " by B. B. Riviere).

WOODCOCK.

Both during this spring and in 1944 I have watched the " roding " flight of Woodcock at dusk up and down the river Bure at Woodbastwick, the numbers seen varying from one to three birds. This is, I think. conclusive evidence of their nesting in this neighbourhood. (B.B.R.)

GREEN SANDPIPER

Two birds were seen on a spit of mud by a pond at Gressenhall by Mr. Hugh Wormald on June 22nd. They flew low round the pond when disturbed and settled again in the same place. It is interesting to record that a pair spent the whole summer on a stream at Stanford Water in 1919, although there is no evidence of their having nested.

BLACK-WINGED STILT

A pair of these birds occupied some marshes near Dunwich in Suffolk for several weeks in June and July. The male had a damaged leg which gave it a limp and which it held at an angle of forty-five degrees with its body when it flew. Several people, including myself, had the pleasure of seeing the birds for the first time in this country, due to the kindness of Major Pardoe.

Later, on August 26th, a stilt was seen at Breydon Water by a visitor to Norfolk from Westmorland, Mr. A. G. Barnes. He described the bird as being lame which points to the fact

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Black-winged Stilts

that the male from Dunwich had moved further north along the coast. (C. E. G.).

FULMAR

A pair were occupying a hole in the vertical face of the highest cliffs between Cromer and Overstrand on June 24th. They were not there when I was next able to look for them on July 28th. It seems probable that these birds were from the small colony which has established itself at Sheringham a few miles to the west. (C. E. G.)

STOCK DOVE

A pair of stock doves at Woodbastwick nested this year in a dense clump of bamboos—a site unique in my experience. The eggs were laid on top of an accumulated mass of dead bamboo leaves and the two young were successfully reared. (B.B.R.).

QUAIL

A bird was flushed from beneath a corn-sheaf by the Hon. R. N. Crossley at Somerleyton on August 2nd. It is the first seen here for many years. Another was flushed by Major H. Birkbeck's retriever on a stubble at Walton on October 24th.

Signed (on behalf of the Council of the Norfolk Naturalists Trust)

CONSTANCE E. GAY, *Secretary*.

VI

FLOWERS OF MAREOTIS

PART II

By F. W. Oliver

An earlier "impression" of this flora appeared in these Transactions (N. & N. Nat. Soc., Vol. XIV, Pt. 4, 1938) several years ago. This second contribution is based on the writer's extended opportunities for continued observations throughout the war-period. Inevitably, under the conditions, his radius was more restricted: nevertheless the Flowery Way, a famous valley-side track, was always accessible, and it may be added was little, if at all, incommoded by military operations—apart from enforced evacuation of its Bedouin population from time to time.

Topographical Preliminary

The writer's headquarters throughout were at Burg el Arab, a village designed and built by Major W. E. Jennings-Bramly some 25 years ago. This place lies just S. of the Inner Ridge (Gebel Mariut) and connects with the shore and Treaty Road at Abu Sir by a by-road of its own. Abu Sir is the site of a Temple and other antiquities dating back to Græco-Roman times, more than 2,000 years ago. These structures were built on the outer or Tænia Ridge, and it is along the lower slopes of this ridge, on its southern side, that the track known as the Flowery Way follows its secluded course—Abu Sir to Sidi Kreir (see map, p. 133).

The diagram (fig. 1, p. 131) illustrates the general character of the relief of the land in this sector and its relation to sea level. In a general way it would serve to explain these relations for any coastal sector between Alexandria and the Egyptian frontier (Sollum), distant 250 miles.

Though the present article features certain aspects of the Flowery Way, including details of several plants which grow there, no attempt is made to illustrate its flora at all fully in the photographs here included, in the expectation that Plates 12—16 in Vol. XIV of these Transactions may suffice. Nor is

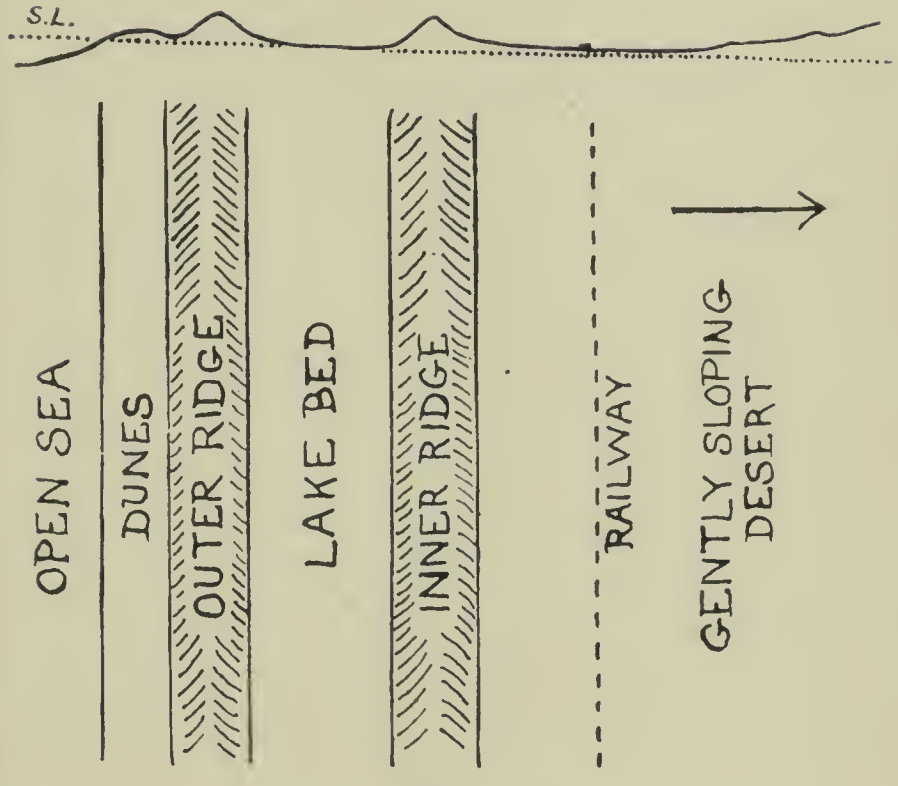

FIG 1.

Diagram of typical coastal belt of Maryut extending ten miles inland, illustrating the successive plant habitats—
Above : profile ; *s.l.*, sea level ; *Below :* the zones in plan.

the selected list of the Mariut Flora (*loc. cit.*, pp. 427—437) reprinted here.

Though what is described here is in general applicable to the entire coastal zone, it is evident that an eye-witness must derive his data primarily from the special haunts which are more readily accessible.

Thus much of what is written here derives from our standard of reference, " The Flowery Way." This track, for that is all it is to-day, was once the ancient road leading from Alexandria to the West. In more recent times it has been superseded for traffic by later roads, and in 1939 by the coastal, or " Treaty Road," which follows the trough between the northern slope of the outer (or Tænia) ridge and the dunes. The Flowery Way lies along the lower slopes of the southerly side of this same ridge, and throughout overlooks the broad, flat valley which contains the lake bed of our branch of Lake Mareotis.

With the relief of this slope, the Flowery Way continually rises and falls, changing direction from time to time, thus providing ever-varying landscapes and freedom from monotony. All along its course is found a greater seclusion than elsewhere ; nor was this seclusion seriously impaired even during the campaign which culminated at Alamein. It will be understood that, especially at Amria, where the Cairo-Alexandria desert road crosses Mariut, and to the S., E., and N. of Burg el Arab itself, were armed camps of major importance. The actual Head Quarters at the time of the battle of Alamein were a trifle E. of Abu Sir, adjacent to the Treaty Road, not far from the section shown on Plate C (above).

The most frequented stretch of the Flowery Way lay between Abu Sir and Sidi Kreir (9 miles further E.). This track, which runs roughly E. and W., borders both cultivation (barley, fig-gardens and occasional patches of olives) and rougher intervening areas, which though unsuited to cultivation abound in wild flowers. These rough bits include stony ridges ascending the hill-side, more level ground where these ridges end above, ledges and terraces parallel to the main ridge, part way up, and the actual wayside.

Nor is the Flowery Way despoiled by children for bunches to sell to passing motorists. No such traffic passes this way ; there is no market. Circumstances thus conspire to give the

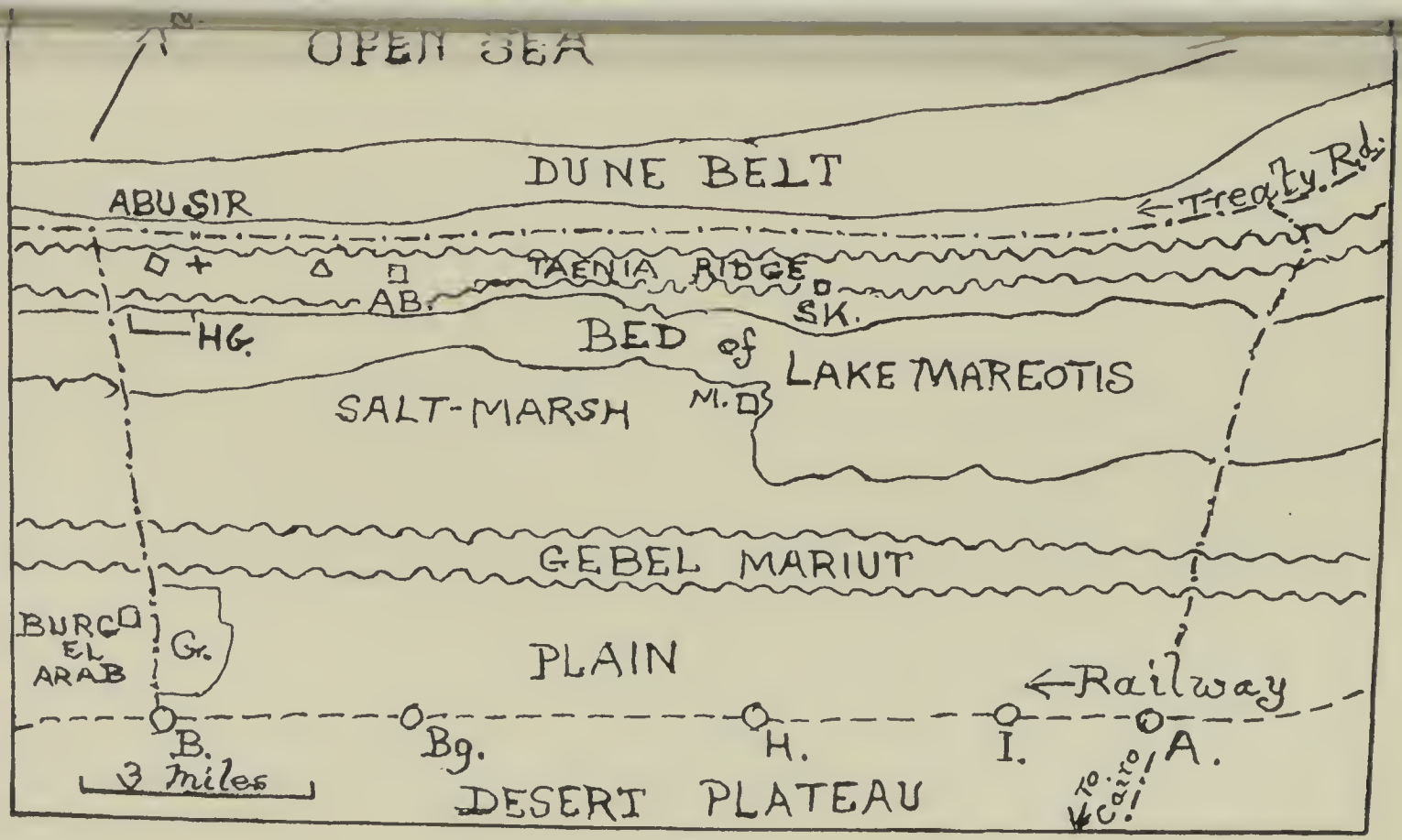

FIG. 2. SKETCH MAP OF DISTRICT.

References: Along Taenia Ridge, l. to r. □ Temple, Abu Sir; + Arabs' Tower; △ Kom el Nugus; AB, Abu Briwah; SK, Sidi Kreir; M, Site of Mareotis; Hb., Quays of ancient harbour; G, Horticultural Garden; Railway-stations; B, Burg el Arab; Bg., Bahig; H, Hawaria; I, Ikingi; A, Amria. The "Flowery Way" runs along the S. slope of the Taenia Ridge, overlooking the Lake Bed. Lines in dot and dash — · — · — are surfaced roads.

Flowery Way seclusion comparable to a "reservation." Its E.—W. course provides very distinct lightings in the morning and evening; moreover as many flowers (e.g. Erodium, Anagallis) close about mid-day, whilst others (such as *Iris Sisyrinchium, Silene* species) open in the afternoons, these peculiarities of behaviour contribute an unexpected element of variety and charm.

Few only of the illustrations here included derive from the Flowery Way. Plate A. is an oblique aerial taken at 1,000 ft., opposite to Abu Sir, from the south. The Flowery Way lies below the front of the picture which was taken by Mr. J.M. Welchman, of the 40 Sqdn. S.A.A.F., on the 25th October, 1942, i.e., three days after the famous barrage with which the Battle of Alamein opened.

The black streak across the picture (above), from R. to L., is the Treaty Road, following the dip between the Taenia Ridge and the dunes above. The sea beyond the dunes is not included. On the road are lorries and trucks serving the army at Alamein. The huts in alignment by the roadside are of recent construction, built for the road-makers.

On the crest of the ridge are, on the left, the Abu Sir Temple enclosure (100 yds. square) with pylon, in shade, on right. Adjacent to this, on the plateau, is an area used as a barrack-yard. In the dip to the right of this is the old road from Burg to the sea—now replaced by a modern road (1940), a quarter mile off the picture, to the left. In the centre is a large quarry from which the stone for the Temple was taken. On the right is the Arab's Tower or Pharos, and beyond this, at the edge of the picture, a small square quarry with a narrow cutting leading in.

On the slope below the large quarry and Pharos are some two dozen Bedouin tents—allowed to remain in spite of the general evacuation. Normally the site carries no Bedouin population (cf, upper photo, pl. D, taken end Feb., 1945), the position being inconvenient for water. On this occasion however far-sighted Nomads migrated here to be near the many caves, quarries, etc., which would afford complete shelter from bombing, should the need arise. On the dunes beyond the road-makers' huts are a few other tents, relying on dispersal for safety.

Description of Plate A.

Plate A.—Oblique air-view from 1,000 ft. of Tænia ridge with Abu Sir showing (l. to r.) Temple, Quarry and Arabs' Tower, from the S. Black line across picture is the Treaty Road; beyond are fig-gardens and dunes. In front (r.) many Bedouin tents. The Flowery Way lies just below edge of picture. Photo taken by J. M. Welchman, 40 Sqdn., S.A.A.F., 25th October, 1942, three days after opening of battle of Alamein.

Air View of Abu Sir from the South

The black dots on the slope up to the dunes are fig plantations. On the left the last oblique row of figs ends below in two smaller bushes. Close by the lower of the pair (just to its left) may be detected a soldiers' goal-post ("soccer"). It stands almost vertically above the left-hand angle of the Temple enclosure. The distance L. to R. of the photo is half-a-mile.

Additional features along the ridge above the Flowery Way include Kom-el-Nugus, its highest point, one and a half mile E. of the Temple. This summit, which has the appearance of being an artificial addition, carries some ruins where a small guard or garrison might formerly have been accommodated. A mile further E. is Abu Briwah which was the source of several photographs which appeared in these Transactions (Vol. XIV, 1938). Some of the lower ground there depicted has since been planted to figs, but the untouched perimeter is still floriferous. Cut deeply into the escarpment are a number of ancient quarries, of which a pair, close together, immediately beneath a comparatively modern Martello Tower named *Mandaret Abu Afish*, are worthy of inspection. This tower is seven miles from the Temple. At 8½ miles is Sidi Kreir, which faces the ancient site of Mareotis across the lake-bed. This stretch of valley-soils, floristically classic ground, has been these ten years in a transitional state due to the gradual change-over from barley crops to fig-gardens, but its glories are not yet wholly departed. In a later contribution to these "Impressions," it may be possible to attempt a sketch of the history of the ups and downs of agriculture and horticulture in the Mariut belt, including the present trends. Naturally, progress must ultimately depend on the provision of markets —otherwise if these are restricted, for instance, to the Alexandria district (e.g. figs), a glut is inevitable, with discouragement to the growers.

* * * * *

Bedouin Practice

As will have been gathered, the raising of crops of barley is still pursued along the Flowery Way in the old care-free manner; as yet we need only wipe out the fig-gardens and occasional

olive-gardens as areas on which wild flora is no longer tolerated —this a tribute to the growing recognition of the value of cultivation where high-priced crops are involved. The piastre-motive. We have to picture here a framework of rough ground, the upper slopes of the main ridge, the stony laterals, the wayside and certain bad patches with soil too shallow for even an Egyptian plough. Within this framework, apart from the figs, are the barley fields of which rather more than half will be growing a crop, whilst the rest remains fallow for the year. "Fallow," here, means just left, after pulling the crop in April till the following October-year. Manuring is not practised; fertility is regained by natural soil-processes.

Bedouin practice in ploughing is divided according to two "schools of thought." There are those who plough and sow early in October, at the onset of the rains, whilst others plough and sow later, following the earlier rain—some even deferring these operations till a late date in December.

The delaying policy appears to spring from a double motive, (1) to be sure of a good germination from greater certainty of rain; (2) by means of a late start to give the crop a better chance of mastering the weeds. Once sown there is no cultivation or weeding. A speculative operation is congenial to Bedouin mentality—the gamble in this case being that the barley, under this technique, is more likely to enjoy the best spaced rainfall and so run through to harvest without a check.

Be that as it may, the early or late "theory" makes a marked difference in the time at which the weeds (i.e. that portion of the wild flora usually associated with the crop) come to maturity. Consequently, where both theories are juxtaposed in adjacent properties, the period over which any given weed will be flowering is much prolonged.

* * * * *

Desert ground in Mariut falls conveniently into four types of terrain, each carrying a distinctive vegetation. These types are (1) The lower slopes with *cultivation*, rich in weed-flora; (2) The *Dunes* by the shore; (3) The Lake-bed or *salt-marsh*; (4) The *higher ridges* and plateaus, largely denuded of soil.

I. The Cultivated Zone.

Taking first the cultivated zone and lower slopes, with which may be included the fallow ground, and uncultivable interspaces. It is here that the deeper soils occur, washed down by rain from the ridges, and dumped on the gentler slopes. Of the Mariut flora, which totals some 700 species, a majority is to be found in this type of terrain.

Perhaps earliest to show in the barley is an aroid, *Arisarum vulgare* whose tubers infest the cultivated ground. Its spadices appear above ground by mid-December, to be followed with early ploughing, by the flower-heads of *Anemone coronaria*—late December—mid February. These occur in two varieties or strains: pale rose and pale lavender-blue—the former with flowers abruptly truncated, the latter with floral segments tapering. Both have dark centres, where the stamens and capels are borne. Characteristically the anemones occur in localised "pools" covering several acres, where they appear in thousands (Pl. E above). Typically any pool will be homogeneous in respect of form and colour, except where, by spread, two pools of different strain intersect, when both forms will mingle. On fallow ground the anemones show less well; and in the rough barely hold their own. This plant responds to the plough, and where the barley is best, there also the anemones, if present, will be taller and larger-flowered. On the whole anemones in Mariut, according to my experience, occupy about 1/10th of the ground on which they might be expected to occur. Of *Anemone coronaria* in Palestine, Canon Tristram writes*—"In every part of the country in profusion, almost invariably the red variety . . . . The most gorgeously painted, the most conspicuous in spring, the most universally spread of all the floral treasures of the Holy Land: if any one plant can claim pre-eminence among the wondrous richness of bloom which clothes the Land of Israel in spring, it is the anemone."

In Mariut our field anemones are nearly a month in advance of the general flora, to which they stand in the relation of a curtain-raiser. At places on the rocky ridge of Gebel Mariut a dwarfer strain occurs where water is held in crannies near the surface. More variable in form, their colour-range includes

* H. B. Tristram; Fauna and Flora of Palestine, 1884, p. 208.

white, cream, pale blue, purple, rose and crimson, but not the Palestinian scarlet. They are exquisite little plants. It would be a grateful and remunerative task if someone, interested in such matters, and possessing leisure and patience, could specialize on these anemones from the genetical angle, and incidentally chart and follow from year to year the progress of the " pools " along the Flowery Way or elsewhere. In matters of detailed ecological research Mariut is almost virgin ground.

As the anemones go out of flower a host of other plants are coming into view—roughly separable into bulbous and annual plants. These culminate in early March and constitute the conspicuous middle period of the field flora.

Among the earlier bulbs is the White Star of Bethlehem (*Ornithogalum tenuifolium*). Though present everywhere, it is especially conspicuous on fallow ground, where it is less liable to be overtopped and sometimes appears as a white carpet to the temporary exclusion of all else. Here and there will be its congener, the yellow *Gagea*, with sessile inflorescence; also met with on the rocky ridges.

In the barley next appear the grape hyacinths, *Muscari comosum* and *M. bicolor*, with blue and brownish flowers, respectively. Both have apical tassels of sterile flowers—*M. comosum* this year (1945) sometimes reaching a density of 60 to the sq. yard (cf. Pl. D. above), a spread attributable to the long period of fallow imposed by interrupted barley cultivation.

Next the Alliums ; a conspicuous feature in the crops as the inflorescences stand well above the barley—a sequence of rose-coloured and white forms. *Allium roseum v. Tourneuxii* deserves special mention in relation to the striking and mysterious effects it evokes, especially on unlevel ground.

Outside the cultivation, especially higher up the ridge, are many specimens of the bright blue-flowered *Scilla peruviana*, with strap-shaped leaves surrounding dense, sessile, flowering cushions.

Some Annuals. By March annual plants are everywhere coming into bloom—alike in the barley and on uncultivated ground. On their presence depends mainly the gaiety and brightness of the scene, whilst among them the *Leguminosæ* (94 species) contribute a fertility-factor, indispensable in a countryside where manuring is not practised. Of these, many

species of Lotus, Hippocrepis (with their curved and curiously appendaged pods), Astragalus, trefoils, vetches, peas, etc., are always present. For particular mention two may be named—*Lotus* (*Tetragonolobus*) *palestinus* for the beauty of its solitary deep red flowers peeping out from a soft green billowy foliage, and *Lathyrus Cicer* for its salmon pink flowers. With both it is the solitary flower rather than a full inflorescence that gives distinction. A further member of the group is *Trigonella stellata*, pale yellow flowers ; of mat-like habit and sweet scent. Present in the cultivation, this plant spreads everywhere ; it is also a striking feature on the open desert.

Close neighbours of the above are the Cruciferæ (50 species)—dominant being 3 species, *Matthiola humilis* (the stock) mauve and sweet scented ; *Enarthrocarpus lyratus*, pale yellow petals with purple veins ; *Carrichtera annua*, white, and especially abundant in the fallows.

These three spread everywhere in the desert where, with Trigonella, they share most of the ground, according to the degree of moisture in the soil. Matthiola is the most telling in the landscape, clothing otherwise bare stony slopes for miles, but, like all mauve-flowered plants, for full effect, it requires a scattering of scarlet neighbours, such as poppies. As these abound in the barley, all in all, Matthiola is best served in the cultivation from the artistic angle.

Another characteristic weed in the cultivation is *Adonis microcarpus* (pheasant's eye), which in moister soils may reach a height of 2-ft. Its petals are nearly always yellow ; an occasional form, otherwise indistinguishable, is scarlet. It may be significant that the red form, when found, is closely related in space to the yellow.

The yellow Adonis, though far from looking like a " tough " plant—no ostentatious display of exterior defensive equipment termed " xerophilous "—may be met with in occasional specimens in many Mariut soils, even the most inhospitable. Other ranunculaceous weeds include *Nigella Tauberti* and *Delphinium nanum*.

At the very height of the season (mid-March) the barley becomes gay with poppies—the principal form being a deep crimson strain of *Papaver Rhœas*, with a black blotch at the base of each petal. It is characteristic of this poppy to be

thinly sprinkled everywhere—not in dense stands so as to smother its neighbours. For poppies, the flowers are unusually large. The addition of this crimson element gives distinction and accent to the varied tints of the associated weeds, and as the air is almost always in motion their heads, standing well up on flexible stalks, are for-ever waving in the breeze. As subjects for colour " films " our landscapes at this juncture are unrivalled. Poppy flowers may look ephemeral, but in bunches for the house they will stand for days.

Nor may this general sketch of the cultivation conclude without reference to certain elements of the Compositæ which become effective in the cultivation at a relatively early stage, even dominating the display.

Strolling along the Flowery Way (later Feb., early March) one beholds the fields of young green barley running up the slope towards the escarpment of the ridge, delimited by lines of yellow (Pl. D, above). These lines are the unsown borders of the barley patches where the vivid, butter-yellow *Chrysanthemum coronarium*, relatively free of competition, comes early to maturity ; later in the crop and on other ground, according as circumstances favour or retard it. This chrysanthemum is the most conspicuous element in the March landscape—in places belts, half-a-mile long and 50 yards wide, may be seen. Here and there its isolated variant, *C. discolor*, may be found, with pale cream ligules. These two, in the hands of plant-breeders, have produced quite a number of garden strains. These chrysanthemums illustrate the perfected composite model. First a central, terminal capitulum ; then in basipetal succession a series of flowering laterals, dressing the plants. Robust and sturdy of habit, these chrysanthemums are typical of that constitutional vigour which confers so high a dominance on the Compositæ as a family.

A little later these are joined, everywhere, by a second composite, *Senecio coronopifolius*, pale lemon yellow ; more delicate in appearance, perhaps, but none the less ubiquitous. Following this is a particularly elegant chamomile-like daisy, *Anthemis rotata* : large heads, white rays and dark centres (Pl. B).

The Waste Ground. Separating the barley fields is a frame-work of uncultivated ground, bare stony buttresses,

Waste ground at edge of barley fie'd

Description of Plate B.

Plate B.—Typical picture of wild flora on border of cultivation. In front isolated heads of *Scorzonera alexandrina*. Across centre; left, Anthemis (white daisy, dark centres); nearer centre *Matthiola humilis* (stock); at right *Chrysanthemum coronarium*; background of barley in spike. Abu Briwah, March, 1938. Photo by K. B. Gatley.

losing themselves above in the main Tænia ridge, terraces and ledges partway up the slope, often parallel to the valley bottom. Many weeds drawn up in the barley-fields are here prostrate, and other plants which hardly enter the barley at all. The situation is bare, more exposed to insolation, free of the plough and crop-competition (Pl. B).

By early March *Ranunculus asiaticus* tells in the landscape. Deep carmine red, like our poppy, though seasonally they are quite ten days in advance. In habit, ranunculus is more dwarf, non-flexible and stocky. Its leaves are rounded and lobed, not deeply dissected as in the poppies. Moreover the calyx persists—not caducous, as in the latter. As a rule each stem ends in a single flower, which may reach a diameter of even 3 inches when wide open.

A characteristic feature is the grouping of the units: they occur in related groups, as it were family parties of a dozen plants perhaps; the nearest group will be some little distance away. This air of aloofness is characteristic. The plant is well fixed in the soil by its bunch of tuberous roots, and often perhaps holds its own by vegetative propagation, like its congener, the lesser celandine, *R. Ficaria*, supplemented by occasional seeding. It would be untrue to imply that *R. asiaticus* is indifferent to favourable conditions; on cuppy ground it is quite capable of occupying the moist depressions.

A plant unrelated to this, *Scorzonera alexandrina*, a sort of salsify, belonging to the Compositæ, flowers about the same time as the ranunculus, and behaves in much the same way as to restricted grouping. Each plant is 6—8 inches high and carries a single head of florets, whilst a circlet of sinuous, strap-shaped leaves sprawls on the ground at its foot. Below the surface the stem ends in an ovate tuber, by which it propagates vegetatively (Pl. B., foreground).

The capitula are broadly funnel-shaped, an inch or more across: the florets all ligulate, and of a delicate mauve tint, which deepens towards the centre, where anther-tubes and stigmas are clustered together, but with space between so that nothing is concealed. The anthers are deepest purple, and the paired stigmas push inside the anther-tubes, brushing out the deep yellow pollen to be exposed against the purple background on the now unrolled stigmatic crosiers in their final phase. It

would appear that such plants as these, by the possession of underground organs of storage, have acquired certain territorial rights which render them immune from the hurly-burly of seed competition characteristic of the less privileged proletariat of annuals. They may succumb in the long run—meanwhile they contribute in detail an elegant and distinctive feature to the nearer floral landscape.

Hereabouts in the rough two other composites are now becoming a conspicuous feature, which increases from day to day. The earlier and lesser is *Anacyclus alexandrinus*, which begins as a rosette of cut, pinnatifid leaves with pointed segments ; next a sessile head of minute yellow florets. Later from this rosette branches arise, prostrate on the ground, each with a terminal capitulum. These repeat the same production of prostrate flowering branches, until the plant covers a sq. foot or more, displaying its diagrammatic construction against the bare soil as background.

This is followed by *Centaurea glomerata*, of precisely the same prostrate, radiate habit—every branch having a terminal head of crowded yellow flowers. Everything is on a much greater scale than in anacyclus, and its spread is a yard or more. On favourable uncultivated places these prostrate anacycluses and centaureas may be counted by scores—like diagrams pegged out on the ground.

With the above foregather later many small tufted composites, such as Crepis, Leontodon, Picridium and Launea with bright yellow Hieracium-like flowers—a gay assemblage set off by pink rock roses (Helianthemum)—*and the Boraginaceæ*. Among the multitude of plants of the wastes and waysides, the Borage Family predominates in later March. Everywhere is the trailing *Alcanna tinctoria*—its grey radiating branches ending in clusters of pale blue forget-me-not-like flowers, with yellow centres. From plant to plant some variation in colour —pastel shades. To an exile the bright bare background, besprinkled with shadows, makes an appeal analogous to that which Egyptians experience on seeing for the first time our green carpets dotted over with primroses, cowslips and wood anemones.

Others of the tribe on these waste places are the viper's buglosses, *Echium sericeum* and *E. setosum*—rough bristly

FIG. 3.

Tortured-looking fragment of Echiochilon with inflorescences (" boragoids ") in the post-flowering position (cf. p. 144).

trailers, both with unnumbered flowering spikes, overflowing from baskets of grey foliage. Bright, funnel-shaped corollas with protruding stamens : *setosum* mainly blue, whilst *sericeum* changes from blue to red, like litmus-paper.

Also in places *Anchusa hybrida* with flowers royal purple (or an equally intense blue), and *Nonnea Viviani*, bush-like, with flowers in mauve. Before leaving this group some mention must be made of a twisted, tortured little bushy plant, *Echiochilon fruticosum* (from Echis, viper, and chilon, lips ; the " lipped viper "), with 2-lipped blue flowers. First it may be explained that members of this family carry their flowers in close spikes at the ends of the branches, and that these spikes are bent over sharply just at the level at which the flower-buds are opening. These hooks or crosiers may be single or paired —that is immaterial. Being characteristic of the family this type of inflorescence is termed a " boragoid." It will be understood that in an ordinary case, as the flowers progressively open and pass into the fruiting phase, the curvature on the stalk advances, the part behind straightening out. This continues till all the flowers have opened and gone into fruit, by which time the axis of the inflorescence will be no longer crooked. It is a temporary device associated with the flowering phase—presumably performing the double function of displaying the open flowers on a conspicuous platform in relation to insect visits, whilst holding the crowded, unopened buds bent over in a relatively secluded position, where they will not be interfered with till their turn comes ; by which time they will be found on the crest (i.e. convexity) of the hook.

In Echiochilon this device has become modified in detail. Instead of the curved zone of the flowering spike advancing apically as the flowers unfold, it lags behind, from an early period, i.e., becomes separated from the general formative zone or meristem, undergoing a hardening, a lignification, of its tissues, so that any subsequent straightening out or unbending is impossible. Consequently we find in Echiochilon these flowering branches, or " boragoids," all bent inwards towards the centre of the plant, with the little blue flowers peeping out from a sort of crumpled basket-work (Fig. 3).

Many plants, possibly a majority, exhibit, both before and after flowering, characteristic movements and curvatures,

the significance of which is not always easy to explain. Thus the well-known wall-creeper, *Ampelopsis Veitchii*, prior to flowering, develops pendent branches, the tips of which are sharply bent upwards. These upturned tips carry the flower-buds of the future inflorescences; but before these buds open the sharp curves are erased and the inflorescences hang down from the ends of their shoots. As a stage in the solution of such puzzles, physiological investigation with operational technique is required for the determination of the various sensitivities and responses of which the plants concerned are capable, in relation to exterior factors such as gravitation, light, temperature and humidity. Without this, no precise knowledge of the nature of the mechanisms involved is possible. Certainly Echiochilon is the most tortured-looking plant in the flora, and might easily be mistaken for a crumpled-up bit of coarse wire netting thrown on the desert.

A Digression on Seed-Dispersal: *Fagonia cretica*—Before leaving this subject of special zones of growth and the related curvatures which arise at the flowering period, an outstanding example from the Mariut flora, that of Fagonia, merits notice (Pl. F above). This plant, with its desert allies, Zygophyllum and Peganum, are included in the natural order Zygophyllaceæ—a family related to Rutaceæ (which includes Ruta and Dictamnus familiar in gardens), from which it differs principally in the lack of oil-glands on its foliage and in the possession of stipules.

The Fagonias are eminently desert types, our Mariut species being *F. cretica*. Its distribution is peculiar and is best described by the statement that it occurs in the most unexpected places—including ridges, hill-sides, lake bed, desert plateaus and even dune areas. In other words it appears indifferent to particular habitats, and where it does occur it is generally sporadic, rather than in dense stands. In view of this distinctive distribution, it may be worth-while to consider in some detail the means of seed-dispersal available to this plant.

Taking the case of a newly-established Fagonia growing on the open desert, where it is not interfered with by neighbouring plants: it will push a substantial tap-root, which descends a foot or more, whilst from the crown several prostrate branches arise which branch in such manner as to produce several

radiating fans which occupy the ground without overlapping. Such system of fans may attain a diameter of perhaps 2-ft. during the first season.

These branches carry at each node, or joint, a pair of compound leaves (3 linear leaflets each) and 4 spiny stipules, and in the axil of *one* leaf of the pair, a flower, shortly stalked. In other words at every node a rotate flower facing upwards, with acute, purple petals (Pl. F. above). Now at every node the stem changes direction slightly—zigzagging—bending alternately right and left. Moreover at a node, as well as a flower, there may also be a vegetative branch—as occasion serves. At the height of flowering, as seen from above, our plant is very gay, the flowers all but touching one another. Then, as the petals fall, each young fruit bends over sharply through the action of its stalk, so that its apex, the style, points directly downwards. This operation is performed with a perfection of accuracy in the following manner. Where the node carries no other branch, the flower dips sideways on the convex or salient side, and as these salients alternate, so too the direction of dip of these young fruits. Where however there is a vegetative branch in addition to a flower, the latter will dip forwards into the angle between the main and lateral branches. Hence according to the circumstances, the flowers dip to R. or L., or into the angle of a branch. To examine a branch-system carrying several hundreds of these fruits, and to find each one obeying the "law of dip," appropriate to its position, is an impressive spectacle—not surpassed by Guards on parade (text-fig. 4, A).

The next phase is fruit-dehiscence and seed-scattering. At the dipping stage each fruit consists of 5 flat carpels arranged symmetrically around the axis of the ovary: the persistent style, the morphological apex of the fruit, pointing vertically downwards—the true basal end of the carpel-complex being attached to the stem which bore it by its *now* hooked pedicel. Roughly, the form of the fruit before dehiscence may be compared with the end of a propellor-shaft carrying 5 flat semi-circular blades, symmetrically distributed (fig. 4, B, D).

The young fruits are greenish, turning brown on ripening. Dehiscence in the 1945 season extended over the period mid-May to early July. The weather was dry throughout—no rain.

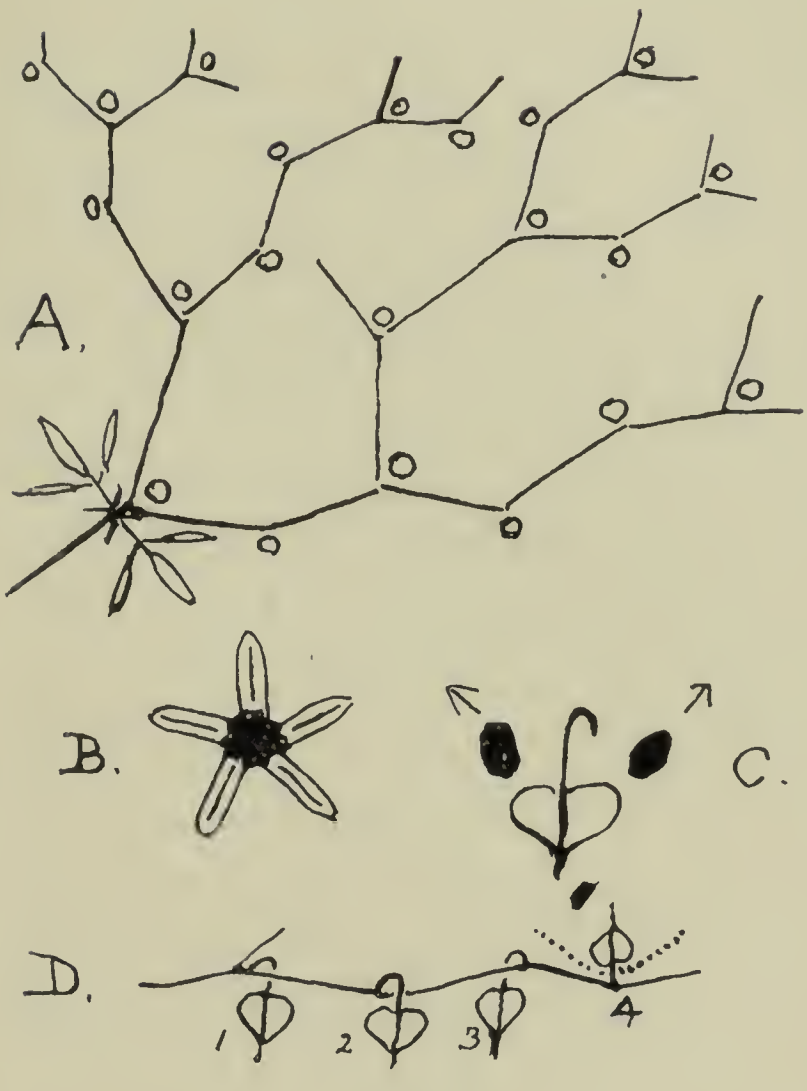

FIG. 4.

Fagonia cretica, &c.

A. Simplified diagram of ramification, showing dipping positions of fruits: also includes a single pair of 3-foliate leaves with stipules.
B. Trans. section fruit: one flat seed in each carpel.
C. Fruit at seed-ejaculation.
D. 1, 2, 3, Fruits after dipping; 4, flower with corolla, facing upwards—prior to dipping.

Details of Dehiscence. Each of the flat carpels of the ovary contains a single seed, flattened in the sense of the carpel and held vertically. Each seed is about 4 mm. long and 3 mm. wide; oval to diamond-shaped in outline; wafer thin, dead black in colour and attached to a basal funicle. On account of their form, and especially their colour, these seeds are readily distinguishable as they lie on the ground after dehiscence. Yet another feature of these seeds may be mentioned here; the external layer is filled with a dry mucilage which instantly becomes intensely sticky the moment it is touched, for instance with a moistened needle. So sticky are these seeds that they might have been used with advantage by our forefathers for sealing letters. Mucilage-testas are not infrequent, but I met with no case more striking than this of Fagonia.

As previously mentioned the young fruits "dip" on losing their corollas. In consequence, the styles face downwards and it is in this inverted position that dehiscence takes place. At the moment of dehiscence two synchronized operations become manifest: (1) The ridge of each carpel splits, starting from a point close to its insertion on the pedicel (i.e. at its *morphological* base, which, in consequence of inversion, is now its *positional* apex). The split extends $\frac{3}{4}$ to $\frac{4}{5}$ths the length of the carpels; (2) Whilst this is taking place each carpel separates partially from the axis of the ovary (i.e. at the positional upper end where the fruit is attached to the pedicel) and swings away from it about 45°. The other ends of the carpels remain attached to the base of the style, persisting in place till they weather away several weeks later.

The moment the slit along the edge of the carpel has extended sufficiently to admit of the passage of the seed, the latter is flicked out in an upward direction and shot to a distance (Fig. 4, C). This action is roughly comparable to the way in which an orange-pip can be flicked out between finger and thumb. Presumably, by the opening of the slit at the positional apex, pressure is relieved at that end, thus allowing the residual compression from below to become effective as the motive power at ejaculation.

As viewed by an observer everything appears to happen at the same moment—there is an explosion and the seed flies out.

What is required here is a cinema film shown as a "slow motion picture." It may be added that the carpels ejaculate their seeds, sometimes in succession, and sometimes, apparently, synchronously.

On the departure of the seeds the emptied fruit remains in place, resembling a half-opened umbrella in miniature—the crooked stalk being the "handle," and the style the "point" of the umbrella. The five carpels by splitting longitudinally now appear as 10 half-carpels—each half-carpel of a pair becoming boat-shaped, the concavities facing one another. This change in form from flat to boat-shaped depends doubtless upon tensions arising in the walls as the cell-layers contract on drying out. Analogous changes in form at dehiscence will be familiar to everybody in the case of many leguminous pods and other dry fruits.

This operation—ejaculation of seeds in *Fagonia cretica*—according to my experience—depends upon dry weather, i.e. it appears to be a desiccation-mechanism. Certainly, as already stated, no drop of rain fell during the period of dehiscence; some plants were even screened against possible dew. This I mention as Ulbrich ("Biologie der Früchte und Samen," Springer, 1928, p. 146) has suggested that dehiscence in Fagonia depends on rain: that there is a swelling layer within the carpel, which on access of water exerts the pressure requisite for ejaculation. Nor did I omit frequently to sprinkle with water plants in fruit, but without any positive result. Admittedly, there are plants, even desert plants, which are provided with swelling layers, but so far as Fagonia is concerned I found no confirmatory evidence.

Of the efficiency of the ejaculatory mechanism in Fagonia there can be no question. Of thousands of dehisced fruits examined I have not found more than two instances of seeds left behind.

Of related zygophyllaceous plants it may be mentioned that *Zygophyllum album* bears fruits in form comparable to those of Fagonia. After flowering they remain in position, without dipping, and on ripening ejaculate their seeds explosively. In *Peganum Harmala* the capsules, so far as noticed, just open loculicidally, but not sufficiently for the seeds to escape. Eventually with the weathering of the capsule, they drop out.

Dispersal. A single detached plant of *Fagonia cretica*, after ejaculation, is found to be surrounded by a circular zone of seeds, extending a distance of about 5-ft. from its centre ; similarly, a line of plants will be accompanied by parallel seed-zones on both sides. In spite of the obstacle which the framework of fronds might present to dispersal, it is evident, on inspection, that the great majority of seeds are not seriously impeded in their flight.

The average number of fruits borne per sq. foot of our plant mosaic is about 400 ; as each fruit contributes five seeds, this gives 2,000 seeds. Should the plant envisaged be 2-ft. in diameter, and roughly circular, this would mean a seed output of about 6,000. In later years, with complex ramification and spread, the yield will be multiplied many times.

Of the *lifting power* of the mechanism of ejaculation some evidence is afforded by counts made of the number of seeds found on the steps and ledges of buildings in front of which lines of Fagonias happened to have become established. It should be explained that these were not specially devised experiments—it just happened. The counts were made on a date taken at random following dehiscence, and have no statistical value. But as they illustrate the potentialities of high trajectory, they are perhaps just worth placing on record.

Two cases may be described here—A and B. In A a line of Fagonias was growing close against the lowest of a flight of four steps. The rise of each tread was 7 inches and the width of each step 12 inches ; the length of frontage, 8-ft. The numbers of the seeds counted on the flats of the successive steps (from below upwards) were 215, 69, 26, and 35. As the Fagonias were growing flush against the bottom step, this proximity doubtless blanketed many aspiring trajectories. The highest of these steps was at 28 inches.

B was a case in which a wall carried a ledge at 26 inches above ground-level, and the sill of a window at 64 inches. The line of Fagonias was 12-ft. in length, with a clear space of 2-ft., between the plants and the wall. The ledge ran the full distance, but the sill was only 3-ft. long. The ledge carried 183 seeds on its 12-ft. run ; the sill at 64 inches (3-ft. long only),

35 seeds. Had this sill been absent, those seeds would doubtless have slipped down the wall and added their number to those on the ledge below.

In effect all the useful information we get out of the above is that a seed may be flung to a distance of about 5-ft. from the centre of a plant, and may be shot up to a height of over 5-ft. This however does not account for the actual distribution of Fagonia plants as observed over this countryside.

There seemed a possibility that in their passage through the air, as in a fresh wind, the seeds might be carried to much greater distances. When these seeds are thrown into the wind, however, they show little or no buoyancy, and seem unfitted for long air-borne transport. They merely stall, and fall to the ground within a few feet, down wind.

Nor are even violent gusts of wind capable of lifting them, once they lie flat on the ground.

Walking barefoot on ground where Fagonias grew and had shot their seed, I soon discovered that the soles of my feet picked up numbers which stuck fast and had to be removed one by one. This suggests that animals, and especially birds, with moist feet are the effective agents in long distance transport. Quantities of sparrows and other birds, are continually playing in such places—feeding on the seeds of grasses and other plants. It is one of their happy hunting-grounds. It is a reasonable presumption that the birds pick them up this way—damp feet—and carry them abroad, some dislodging. I scruple to shoot birds to prove this link in the evidence ; they are in a sense my tenants, and would resent such violent and unusual action on the part of their patron. However, under the circumstances, it seems remotely improbable that these birds could avoid carrying away numbers of these extremely sticky seeds.

* * * * *

Analogous correlations in the changed position at flowering and fruiting, due to curvatures of the stalk, occur in numerous plants. Thus in *Fritillaria imperialis* it is the *flower* which " nods," whilst as the fruit ripens the stalk straightens out and the capsule is held erect. Dehiscence (which is non-explosive) is apical, so that the erect position ensures that the seeds remain in the opened carpels till shaken out by gusts of wind.

Otherwise, in the hanging position, they would merely fall at the base of the plant.

Then in the poppy it is the flower *bud* that nods : on opening, the stalk straightens out and the pepper-pot-like capsule is held erect, and on ripening the minute seeds will be shaken out by windage through the marginal pores.

In the squirting cucumber (*Ecballium Elaterium*) the flower faces upwards, and at the fruiting stage is (like Fagonia) bent down by the curvature of its stalk. At ripening (unlike Fagonia) the fruit becomes pulpy and a high internal pressure develops. Concurrently the attachment of the stalk at its insertion weakens, so that any shock, even a light touch, suffices to detach the highly turgescent fruit, which at the same moment discharges its entire contents (mucilage and seeds) as an upward jet, carrying many yards. Though the analogies in position conform to the Fagonia type, the mechanism of ejaculation is here a *wet* one, whilst in Fagonia it is *dry*, depending on tensions arising in the carpellary walls as the fruit dries out.

* * * * *

" Miniature Gardens "

Before leaving this tract of mingled cultivation and waste land brief reference may be made to what happens in seasons of serious shortage of rain. An adequate floral display demands about 200 mm. of rain (October to March), suitably spaced in time. Should rain fail after December (as in the season 1940—41), production of the later flora is largely suppressed. In certain years thus threatened there may come some late February showers which save the situation. Thus in 1939—40, though the total rainfall barely exceeded 100 mm., in view of these refreshing late showers the annuals managed to push through in restrained form, realizing, perhaps, that liberties should not be taken in view of the favour vouchsafed. The result that year was a display of miniature gardens well shown on level stretches, e.g., alongside the Treaty Road. These " gardens " were not just unprivileged assemblages of depauperate specimens, but perfect plants on Lilliputian scale. Instead of a foot, they reached a few inches from the ground, with dwarf poppies overtopping and rippling in the breeze. Such sites are shown in Pl. C. (above), a view of the Treaty

Treaty Road between Abu Sir and Sidi Kreir, looking E.

N. Slope and Dunes below Abu Sir

Description of Plate C.

Plate C (above).—Detail of Treaty Road, 4 miles E. of Abu Sir—Alexandria 30 miles beyond. Dunes on l. behind grove of date-palms. "Miniature Gardens" often arise on the dusty verges (cf. p. 19), October, 1944.

Plate C (below).—Rocky slope of Tænia ridge below Abu Sir, looking N. Treaty Rd. (not then constructed) now runs parallel to foot of slope. Beyond are fig-gardens, oolithic dunes and the sea. 1937.

Road taken in October, 1944—just two years after the Battle of Alamein—when " the Captains and the Kings had departed." The picture shows a section of this road a few miles west of Abu Sir, near by the then H.Q. of the British Armies. Alexandria is over the horizon, some 30 miles away. It was these dusty verges which carried miniature gardens all the way.

2. The Oolithic Dune Belt.

We may now turn our steps to the dunes—the coastal zone bordering the sea, some thousand yards in width. These are concealed from Burg, becoming visible only as the crest of the outer ridge is reached (the Taenia ridge, on which Abu Sir and the temple are situated). Here suddenly they appear below as a white fringe, with the sea beyond (Pl. C below). Spectacularly this is a great moment depending on the unique colouring of the sea against this white foreground. The waters of the Mediterranean are in general termed " blue," but here, all along the Mariut coast, where they wash the oolithic dune-belt, they appear deepest ultramarine, iridescent and lustrous, like the wing-colouring of certain large Brazilian butterflies. This doubtless is an optical effect not presented by the African coast further west (e.g. Algiers, Oran), nor east beyond the outskirts of Alexandria, where the oolith element dies out. New-comers and residents alike, are invariably impressed by an unforgettable seascape thus, suddenly, revealed to their gaze. As one stands at the edge and watches the waves breaking, just in the act of turning over, they appear pale jade green. The ultramarine must be a surface effect. The degree and quality of colouring show great variations in relation to the position of the sun, the presence of fleeting cloud-shadows, vapour and haze. Our " Riviera " also has the advantage of being free of glare from the sea, as the shoreline faces north. Perhaps some war-weary meteorologist, released from his labours of forecasting weather, might find a " busman's holiday " in studying, and perhaps elucidating, a miracle so inadequately depicted in this paragraph.

And now for a stroll across the dunes. As stated, they are composed not of silicious sand but of ooliths, white carbonate of lime concretions, thrown up by the sea. These ooliths behave to windage as do coarse grains of sand. With the sun

beating down they appear dazzling, and one might well wonder whether all tender vegetation would not be scorched. Far from it. The prevalent winds from the N.W. are cooled by the sea, and the fresh-water table is so near the surface that wells dug 3 to 4 ft. deep, and within 100 yards of the shore, provide the freshest water in the district. Winter rain percolates the ooliths and, presumably floats on the sea-water table. The case seems comparable to our fresh-water wells at Blakeney Point. There is a gentle movement of the fresh-water—just rapid enough to replace that which becomes salty by diffusion from the underlying sea-water. At Blakeney with the springtides the freshwater rises several feet in the wells. But at Blakeney the tidal range is 15-ft., whereas on this coast it is barely 18 inches. Doubtless, could a well be reserved for observation a similar but very slight rise and fall would be detected, but as the Bedouins draw water from these wells, any well reserved for such observations would have to be kept under constant guard.

The flora these dunes sustain is no monotonous carpet ; a single stroll across gives no " transverse section " of the plant-population. Its distribution is not homogeneous. In general the relief slopes up from the shore to the fixed mainland at the foot of the Taenia ridge where the coastal road runs.

The landward edge is the more stabilized, especially by bushes of Thymelaea, tufted perennial low-growing shrubs of a yellow flowering rest harrow (*Ononis vaginalis*), and in spring-time a gay carpet of *Centaurea pumila*, with sessile trusses of rose-coloured flowers. Further out, a sprinkling of marram grass (*Psamma*) which would be more effective as a surface-fixer but for occasional grazing by goats. Nearer the sea are bushes, sometimes almost thickets, of the broom, *Retama Rætam*, covered in February with white flowers, sometimes with purple spots.

Close to the shore tufts of *Euphorbia Paralias* are frequent, as also is *Zygophyllum album*, an effective dune-builder. This plant is a congener of Fagonia, already described in detail, but nothing more different in habit can be imagined. An up-growing, jointed plant, with succulent leaves (a fleshy petiole carrying two fleshy leaflets). Like Fagonia, its flowers produce 5-lobed fruits, which on ripening are explosive, but unlike

Description of Plate D.

Plate D (above). Tænia ridge from Flowery Way. Shows adjacent barley fields with line of *Chrysanthemum coronarium* defining boundary (cf. text, p 9). In barley, esp. in. foreground much Muscari (darker stalks); note Arabs' Tower (skyline l.); Bedouin tents no longer on escarpment below (cf. Pl. A and p. 3). End February, 1945.

Plate D (below). — Drifted dust held up by garden wall has overflowed to form bridgehead in garden to r. Height of wall, 5-ft. Bedouins on l. filling sacks with dust. Burg el Arab, April, 1942.

Taenia Ridge from S. side

Garden wall holding drifted dust

Fagonia it shows no sophisticated nutations or bending over of its fruits. It is a heavy seeder and some years will be bowed down to the ground by the weight of its fruits.

Three species of bulbs occur on these dunes. In early December a "Meadow saffron," *Colchicum Ritchii*, pushes its fragrant, rose-coloured flowers. The corms are dug by the Bedouin, perhaps an an antidote to rheumatism, though the colchicin-content of this species is small.

Urginea (*Scilla*) *maritima*, with immense bulbs and yard-high flowering spikes in June, is rare here due to exploitation—more frequent further west.

Finally, flowering in August, is *Pancratium maritimum*, often occupying extensive dune-stretches. Its flowers are modelled on the pattern of a trumpet daffodil, but its narrow acute perianth segments are dead white, with pale green streaks outside, and show up effectively against the creamy background of ooliths.

Many smaller plants, chiefly annuals, are dotted about, of which may be mentioned the bright, blue-flowered *Salvia lanigera*; *Lotus argenteus* and *Diotis maritima* (cotton weed) with silvery leaves, and a rose-coloured campion, *Silene succulenta*, one of the few undeniably succulent plants in this flora. Nor should reference to *Hypecoum aegyptiacum* be omitted—of the poppy family with bilaterally symmetrical flowers—yellow with purple blotches—acceptable both from its sheer beauty as a plant, and likewise from the botanical controversies in which formerly it became involved.

These oolithic dunes possess, in addition to the plants they carry, a physical interest depending on the consolidation of the units into rock and their subsequent disintegration by wind erosion. In this way arise odd, fantastic ruins, hardly intelligible at ground level, but from the air fitting into the local dune plan (cf. These *Trans*, Vol. XIV, pl. 16, p.418).

The actual shore-line in the absence of effective tides is never deserted by the waves, whilst the drift holds some interest from the strange assortment of flotsam and jetsam continually thrown up. Included in this drift, and a puzzle at first sight, are quantities of Posidonia-balls derived from a submerged marine plant of that name allied to our pond weeds (*Potamogetons*). Heavy seas uproot the rhizomes and attached strap-like

leaves. The latter as they float in the sea become macerated and reduced to a plexus of fine fibres, which, in consequence of the constant motion of the waves as they drift, become woven into balls of all sizes, up to 4 inches in diameter. Commonly, when cut open, some trace of the fragment of rhizome which bore those leaves survives as a core. Where this is relatively long, the " balls " are oval. Associated with these in the drift are identifiable fragments of several non-African trees, which gives some support to a current view that all these objects have been drifted across the Mediterranean from Europe by the prevalent N.W. winds.

3. The Salt-Marsh.

This is represented by the western arm of Lake Mareotis, long separated by causeways from the main body of the lake. Liable to flooding in winter, it is relatively dry in summer. In general appearance the lake-bed recalls an East Anglian marsh, with its scrub dominated by *Suæda fruticosa* (and other species) and *Obione portulacoides*, together with shrubby salicornia-like types, and *Juncus maritimus*. Outstanding at flowering time (May) are sheets of Limoniastrum with vivid lilac spikes. Earlier (March), the dwarf *Iris Sisyrinchium* forms acre-wide blue and purple flowering carpets with the plants crowded to capacity. Pl. E—below, shows a portion of such carpet—in which every plant is a specimen of this Iris. This plant also finds its way into the cultivation, though in lesser density.

Also, in places, are large areas of *Statice delicatula*, in pure formation. It has minute purple flowers, elegantly disposed on yard-high ramifying inflorescences. Though built on the same plan as the common British *S. Limonium*, these plants are tall, flexuous and undulating—not stocky. Other species of Statice belong more especially to the ridges and are referred to in Section 4.

4. The Ridges

In concluding this review we cannot do better than explore Gebel Mariut (the inner ridge) which overlooks the village of Burg el Arab. The main flora here matures relatively late (May—June) and features especially Labiates and Composites.

Anemone coronaria

Iris Sisyrinchium on lake-bed

Description of Plate E.

Plate E (above). —" Pool " of *Anemone coronaria* established in advance of barley; from Flowery Way below Abu Sir, looking S. across lake-bed. December, 1938.

Plate E (below). —Lake-bed near Abu Sir, looking S. Gebel Mariut closes in the picture, of which the lower half is occupied by a pure community of *Iris Sisyrinchium*. March, 1945.

Earlier it is the statices which attract attention. In Britain the five species of statice are restricted to the coastal zone. The world's population however provides some 120 species, of which probably a majority inhabit continental salt steppes—not represented in Britain. On the Mariut hills, conspicuous in March, are 3 species, meriting attention, viz., *Statice Thouini*, *S. pruinosa* and *S. tubiflora*, all differing markedly in habit of growth, colour at flowering, and relative persistence of corolla. To this group may be united the lake-bed species, *S. delicatula*, already referred to. Although not found on the ridges by me, a few specimens planted in the garden seeded abundantly and without special attention spread everywhere, showing it to be a potential weed. So far as it goes, this is in harmony with its competence on the lake-bed, where it forms extensive stands to the exclusion of everything else.

Statice Thouini is an annual, and may reach a height of 2 feet. The leaves, borne in a basal rosette, are pinnatifid—recalling those of the annual *S. sinuata*, found in seedsmen's lists. The ultimate branches of the inflorescence are winged; the conspicuous calyx pale Cambridge blue (fading to white), with a bristle in each sinus; the corolla yellow to cream, extremely fugitive.

S. pruinosa, though found on the higher levels of the salt-marsh, is more frequent on the ridges and in the wadis. The tuft of obovate, basal leaves does not long persist. Its conspicuous features are the triangular, frond-like branch-complexes produced in one plane, which make up the inflorescence; the main axis characteristically zigzag, the lower branches sterile, and the flowering laterals in curved cymes. Calyx pale, funnel-shaped, with dark midribs to the lobes. Corolla mauve, fugitive. In its special genre, especially when covered with newly opened flowers, our flora shows no more elegant plant.

S. tubiflora is very distinct from all these. Habit prostrate (not unlike *S. reticulata* of the E. Anglian marshes). Flowering axes bunched in the centre of the basal rosette of leaves; sterile branches below, and the flowers in dense panicles. Corollas deep rose-coloured, relatively large and long-persisting. Calyx of narrow, glistening segments. A choice plant for the rockery.

S. delicatula—tall and flexuous : flowers closely set ; calyx less expanded than in *S. pruinosa ;* has similar crimson midribs to its calyx-lobes.

All these species agree in adhering rigidly to the conventional floral diagram of Plumbaginaceæ ; calyx 5, corolla 5, stamens 5 (opp. the petals), gynæcium 5 styles arising from a 1-seeded ovary. With such a wide range of diversity in detail (habit ; floral peculiarities) combined with uniformity in floral pattern, this group presents a pretty study for botanists and others. A table is included, featuring some of these points.

Species	Habit	Calyx	Corolla
S. tubiflora	prostrate	narrow acute white segments	crimson (persistent)
S. Thouini	annual erect winged scapes	pale blue lobed funnel, with bristles between the lobes	pale yellow (fugitive)
S. pruinosa	stiff horizontal fan-like branches	pale funnel lobes with dark midribs	pink (fugitive)
S. delicatula	tall, flexuous gregarious	white funnel lobes with deep red midribs	purple (relatively persistent)

Statice species compared.

To resume the stroll on the ridge. There will be sundry Labiates—the tall *Phlomis floccosa*, with glaucous foliage and heads of yellow flowers. *Thymus capitatus* (white thyme) in quantity. *Teucrium Polium*, and the related *Globularia arabica*—spherical blue heads of small flowers everywhere on the rocks.

At this latter end of the season, many robust composites come into their own. Alongside the majestic *Onopordon Sibthorpianum*, are other thistles, and thickets of *Echinops spinosus* (globe thistle). These latter recall, in miniature, the milk thistles (*Silybum Marianum*) of the Argentine pampas which Hudson depicts so graphically.* The large spiny heads of our globe thistle detach on ripening, when battered by the wind, and career across the desert. They are driven, bouncing

*W. H. Hudson. "Far away and Long Ago," cap. 5.

Description of Plate F.

Plate F (above). Fagonia in flower. Photo by J. P. Lotsy, February, 1931.

Plate F (below). *Anabasis articulata*, the purple bush. Photo by J. P. Lotsy, 1931.

Fagonia in flower

Anabasis articulata

in long hops on their formidable but resilient spines, liberating a cloud of plumed fruits at every impact—like some new-fangled grenade, detonating intermittently.

By contrast, nestling in rock crannies, are dwarf prickly rosettes of carline thistles (*Carlina involucrata* and its ally *Atractylis flava*). No wonder the Scots adopted the Thistle as emblem !

Other conspicuous end-of-season plants include the Mesembryanthemums (*M. crystallinum* and *nodiflorum*) carpeting stony summits with their ruddy succulence. On these exposed situations the leaves seem to encrust the surface. Very different is the habit of *M. crystallinum* when established on the damp floor of a shady quarry, where it will grow knee-deep like rhubarb. The related *Aizoon canariense*, also present, has latterly spread into the fallow—a noxious weed.

Even the omnivorous goat declines these mesembryanthemums, and after prolonged scrutiny will at length extract a dead tuft of grass and munch it with contemptuous condescension.

Of the later flowerers Pancratium, on the dunes, has already been noted. On the heights, by November, flowers the last plant of all, *Anabasis articulata*, a much-ramifying bush of the Salicornia affinity, gay with flowers enclosed each in a purple fruiting perianth, hence called the purple bush (Pl. F. below).

The War Phase

Before closing down these random notes some reference may be made to the more immediate effects of war-time conditions on desert vegetation and cultivations. More especially as such opportunity may not recur in any predictable future. Briefly they were like this.

(1) Whenever there seemed risk of armies clashing, in this or that district, the Bedouin populations would be evacuated to the edge of the Delta, and as the threat passed they would trickle back again. This meant interruption of seasonal operations—ploughing and sowing. Fields would be left in fallow beyond the normal period ; in fact a general lowering of agricultural standards as observed by the Bedouin. Then, as evacuated Nomads from further West passed by, camping with their herds, they being relatively irresponsible, would

pull scrub indiscriminately from the desert for kindling, as available. The troops did likewise. Thus, much surface was stripped bare, where otherwise care would have been exercised. Notably the favourite fuel, bushes of Thymelæa, full of oil, would vanish in a day. Thus was cover depleted.

(2) Then the army's mechanical transport—lorries, tanks, guns—would be driven everywhere on non-macadamised desert surfaces (the only proper roads were the " Treaty Road " and its infrequent laterals). In consequence the surface would be pulverized eight inches deep, and being no longer suitable, the traffic would go this way and that way until the whole visible surface had been reduced to a blanket of fine dust. Thus was provided an enormous dust-reservoir, a plaything for the wind to raise in clouds.

Now in normal times a certain amount of dust arises automatically from a more or less natural erosion. This provision served to feed an average of some 4 or 5 dust-storms* per annum, especially in spring, when hot Khamsin winds are apt to come from the south.

But now with the military operations just indicated, together with unregulated pulling of scrub, the desert became extremely dust-storm sensitive, and the incidence 10-fold or more.

The adjacent table summarizes the number of dust-storms over the war-period. It also includes the approximate rainfall recorded for the Burg el Arab district. For explanation of sub-dust-storms see page 162.

Vegetational years (Oct.—Sept.)	Average pre-war years	1937/38	1938/39	1939/40	1940/41	1941/42	1942/43	1943/44	1944/45
Number of dust-storms each year	3 to 4	2	2	8	40	51	20	25 + (20)	4 + (7)
Rainfall in millimetres (25 mm.—1 inch) ...	Circa 120	257	119	106½	83	106	177	100½	247

Table giving summary of dust-storms and rainfall over the period 1937—1945. The bracketed figures (20) in the right-hand columns refer to the number of *sub-dust-storms* recorded in 1943/44, and 1944/45.

* A dust-storm as here defined means a drift of dust of indefinite upward extension, reducing visibility at ground level to 600 yards. Such conditions usually persist for half-a-day or more, obliterating the sun, and sometimes continuing far into the night.

The factors involved in dust-storms include :—

(1) The magnitude of the reservoir of loose-lying dust.

(2) The frequency, velocity and character of the winds. No wind, no dust-storm. Given an adequate dust reservoir, a wind of 10—12 m.p.h. suffices to raise the dust. Gusty and turbulent winds are especially efficient in the matter.

(3) Rainfall, wetting the dust, tends to keep it on the ground ; but it is remarkable how quickly a stiff breeze will dry the surface and raise the dust.

(4) The previous removal of scrub, loss of cover, obviously collaborates with windage in this matter.

(5) Rain during the growing season, according to its amount, has a further and even more important indirect effect in controlling dust by the raising of a carpet of plants—especially annuals.

* * * * *

These considerations help in the interpretation of dust-storm frequencies. Rain, as rain, temporarily immobilizes dust ; but it has a far greater controlling effect by promoting an ample vegetation-carpet which shelters the surface throughout the season most liable to heavy windage (Jan. to May).

To complete the statement the number of calm days might be included ; also the state of the dust-reservoir from time to time ; but these are matters outside the scope of the present article.

One further point may be referred to. Following the Battle of Alamein, which opened 22nd October, 1942, the armies moved West, and the local disturbance of desert surface, gradually abated. From this date with the gradual exhaustion of the dust reservoir, it became noticeable that higher wind velocities were required to raise dust-storms (i.e. such as gave visibilities of 600 yards or less). Where previously a 12 or 15 m.p.h. wind sufficed, now (and henceforward, increasingly) velocities of 20 or even 30 m.p.h. were required to produce the results of earlier years. Moderate windage would now raise dust clouds of relatively slight obscurity—i.e. with visibilities of 1000 to 1500 yards.

Such lighter dust-storms had been excluded from the tables in the earlier years, but in 1943/44 and 1944/45, as it appeared useful to record them, their numbers in any month are included in brackets (e.g. (20), cf. table, p. 160).

These rank in nomenclature as " sub-dust-storms," and were the product of wind velocities ranging from 15 to 25 or even 30 m.p.h." True " dust-storms (as originally defined) with visibilities of 600 yards or less, became infrequent, and now required windages well above 30 m.p.h.

The abnormal dust-reservoir was in process of exhaustion, and in 1944/45 the vegetation carpet ample.

* * * * *

It is unsafe to prophesy : but to all appearance the *aggravated* dust-phenomena of the war period have all but died away. The entire display was an isolated event in history, which should not recur. As previously, so in the future, there will be dust-storms when the wind blows hard enough, and other conditions allow dust to be lifted. A certain amount of dust is a natural product of a degrading desert surface ; but unless there should be unforeseen changes in the local meteorology, posterity should never experience dust-storm incidence comparable to that recorded above for 1940/41 and 1941/42.

Dust and Vegetation

During severe dust-storms the amounts of dust shifted are considerable. This is evident from the quantities which pile up against such obstacles as walls. In a few months, during the peak years, banks of dust would accumulate on the windward side of exposed walls : (5—6 ft. in Pl. D below ; in other cases up to 10 ft.) These result from drift at or near ground-level. Then there are the overhead clouds, often blotting out the sun. These will drop dust as they drift along of the magnitude of $\frac{1}{8}$, $\frac{1}{4}$ and perhaps $\frac{1}{2}$ ton, per acre, per hour. Much that falls will remain, especially where the surface is furrowed by ploughing, or otherwise has irregular relief.

It may be explained that the soils we deal with are migratory. Wind, especially from the southern sector, brings dust of which a portion will fall on the land. Other portions will precipitate far out to sea, as experienced by vessels hundreds of miles out, whose paint-work deteriorates under this infliction.

On the other hand the prevailing winds (N.W.) come from the sea, and these drive the ooliths landwards. These little concretions may average $\frac{1}{2}$ mm. in diameter; they do not float in the air but hop along the ground, driven by wind in the same way as large grains of sand are driven. The ooliths from the N.W., and the dust from the S. thus mingle, and together form a fertile soil. The dust carries a fraction of combined nitrogen readily available to plants. These two elements in combination make up our most fertile soils—for it is on such ground that fig and other gardens are planted—melons, grapes and tomatoes raised.

On the slopes of the Flowery Way facing S. the oolith soils may contain up to 40 per cent. of desert dust. Ooliths from the beach, though they reach the Flowery Way hopping before the wind, cannot at the present time cross the lake bed, owing to its moist, sticky surface. Such as are present in soils further S.—apart from those that drifted across in geological times prior to the formation of the lake—must derive from the limestone ridges by weathering and erosion.

Of the fertility conferred by dust, the local gardens may be cited in evidence. Without question these flourished amazingly during the years of high incidence (especially 1940/41 and 1941/42). The plants were just the common decorative things such as Freesias, Sparaxis, nasturtiums, scarlet flax, Petunias, Dimorphothecas, stocks (especially the "Beauty Stocks" of Nice). In the garden in years of comparative rain shortage (as these two named years were) any water deficiency could be made good by watering. The best gardening year was 1941/42. All these plants did far better than noted in previous seasons, in respect not only of height and development of plants, quantity of flowers produced and the long period of flowering (nasturtiums, for instance for 7 months), but also size of flowers, brilliancy of colouring, and where scented by volume of fragrance.

In this verdict the few who upkept their gardens during the period would concur. Every dust-storm contributed a sprinkling of dust, and when this was repeated on 50 occasions, as in 1941/42, the accretion of nitrates would be significant. The Delta of Egypt may be refreshed by the silt brought by the arrival of the High Nile, but these dust-storms, by their

frequency, though each alone be almost negligible, in their aggregate must have conferred no mean fertility. This evidence, trifling though it be in quantity, gains in significance as it is all we have to judge by.

The ooliths make a different contribution. By their dimensions (average $\frac{1}{2}$ mm.) they confer an open texture to the soil, alleviating the sticky (clayey-colloidal) end-product which a pure, fine-grain dust, of particles less than 1/10th millimetre, must lead to. In the loose oolith dunes near the sea, the surface appears to be dry enough. But at no great depth there is moisture. The ooliths act as a surface mulch.

This is well shown by the Posidonia fibre-balls which come ashore here in great numbers. On the drift-line they soon dry out and the winds scatter them over the dunes, where the majority become buried. Here and there these balls (which are 3 to 4 inches in diameter) will be only half buried, and if such be examined the buried ends will be found to be quite moist showing that the oolith-" sand " conserves water at no great depth.

These two elements in these maritime soils (dust and ooliths) have a possible bearing on any future scheme of reclamation relating to the Mariut seaboard. With the mechanical methods now available, and which the recent war has amply demonstrated, all sorts of possibilities, not previously entertained, e.g. in soil-mixings, become available. In this connection it may be added that even rough Bedouin experiments in fruit-growing (figs, melons, grapes, etc.) show this great merit—that the products have an excellence of quality not generally found elsewhere, even in this favoured country ; i.e., a delicacy of flavour which might be compared with the excellency of " Chateau Wines " as contrasted with *vin ordinaire*. It is this possibility of quality-production that may be stressed.

Burg el Arab

December, 1945.

VII

NOTES FROM GERMAN PRISON CAMPS

By G. C. H. Chandler

A factor which the Germans could never appreciate when dealing with prisoners of war was their inherent sense of humour. They could never realise that the harder they kicked us around, the more we bounced. Our main entertainment consisted in the merciless sport of "Goon-baiting," officers and other ranks being subjected to the same treatment; when this became indiscreet or unhealthy, we turned to something else, such as the study of birds and flora of the camp and its surroundings. Stalag Luft VI was the best camp we occupied from this point of view and we made a longer stay there than elsewhere, but opportunities for watching birds were restricted by the rigid security measures maintained by the Luftwaffe. All prisoners were locked up each night and during the summer were not released until some considerable time after sunrise. Normally no one was allowed out of the compound except under close supervision and the penalty for evasion was too drastic to justify the end. Considerable interest in Natural History was shown by the prisoners, but the German guards were mostly apathetic. The only German officer, who was at all keen on Ornithology, "volunteered" for the Russian front when his interest became known to the higher authorities.

Situated about thirty miles from Memel and forty from Konigsberg, the camp was surrounded by stagnant marshes and open country, which is characteristic of Lithuania. It was on the main migration route of birds coming north to Scandinavia and the eastern Baltic, and of birds coming east from Denmark and northern Germany. An incident which stands out in my mind was the arrival of a golden oriole in a wood near the camp in the second week in June. Its normal time of arrival in England is the latter half of May and first week in June. Unfortunately the camp was hurriedly evacuated in July so that we never knew whether the bird nested there or not, but it was certainly well within its normal breeding range.

I was impressed by the vivid beauty of the bird, whose golden colouring was accentuated by the pale green of the birch trees against which I first saw it. The contrast between the different notes was very striking and hardly in keeping with the beauty of the bird. To quote my impressions written at the time: "The peaceful atmosphere was disturbed by a fairly loud noise somewhat similar to the screech of a jay and the cry of a trapped cat probably made by a hen followed by a very powerful thrush-like note rising to a bell-like crescendo in the middle and falling softly to a finish . . . . phonetically, its song notes sounded somewhat like 'me–me,–tu–wee–oo.'" and was certainly made by the cock.

Perhaps the most impressive aspect of Stalag Luft VI was the flora of the camp. No mixing was allowed between compounds except during occasional games and as a consequence the ground inside the various compounds was soon devoid of any flora, with one noteworthy exception: the areas between the outside fence and the "warning wire." This area consisted of about an acre out of a compound of eight acres holding a concentration of about 240,000 people to the square mile. In all, 109 different species of flowering plants were identified during 1944. One flower which was dominant in a swampy corner of the compound was the water avens (*Geum rivale*), whose red flowers gave a distinct coloration to the corner. This swamp was fed by a slow-flowing ditch which connected it with the Sports Field where such plants as maiden pink (*Dianthus deltoides*), round-leaved sundew (*Drosera rotundifolia*), marsh orchis (*Orchis latifolia*), reed-mace (*Typha latifolia*) and bur-reeds (*Sparganium ramosum* and *S. natans*) were growing.

A large birch wood on the northern edge of the camp was the nesting ground of large numbers of different birds. Willow wrens, chaffinches, wheatears and linnets, as well as starlings and tits were all present in varying numbers. Apart from the oriole, the most interesting birds were the thrush-nightingales. The main distinguishing feature between the ordinary nightingale and the thrush-nightingale lies in the song. There were at least five of these birds living in this particular wood. Whilst the great majority of Germans approached on the subject admitted complete ignorance, one or two of the guards

told us that they called these birds "thrushes" and not "nightingales."

Being so near the Baltic, large numbers of duck and wild geese were seen. At the end of April, on a Sunday evening, twenty-seven sheld-ducks flew over the camp in ragged formation and appeared to have just completed a long migratory flight, for as they passed over the camp they began to glide and eventually alighted on the marshes by the river a little way to the north. A pair of mallard were known to be breeding in a pool at the back of the wood north of the camp.

In July, 1944 Stalag Luft VI was hurriedly evacuated and the majority of the British prisoners were moved to Stalag 357, about five miles north of Thorn in Poland, beside the main Thorn-Bromberg road. Originally the camp had been partly used by Field-Marshal Rommel, when he trained his Afrika Korps on the big training-ground near the camp. The district was mainly an undulating sandy heathland with a very small flora. The main flowers of interest were the pasque-flower (*Anemone pulsatilla*) well-established in one place in the centre of the camp, a star-of-Bethlehem (*Ornithogalum pyrenaicum*) in the same locality, and the Deptford pink (*Dianthus armeria*), very common all over the camp and apparently a characteristic plant of the district. The spikes of the *Ornithogalum* were impressive, being over two feet high and the flowers over an inch in diameter. Not many birds were seen here, probably because the temperature was very high all the time we were in the camp.

After three weeks at Thorn we moved camp to Fallingböstel, a small hamlet about thirty miles north of Hanover. This place was a complete contrast to the previous station at Thorn. The sudden change of flora from one of typical sandy heathland to one of a rich loamy soil had an invigorating effect on the mind, which helped us later when the physical conditions imposed by the Germans became almost unbelievably hard. The first features which struck me were the dominance of the Canadian fleabane (*Erigeron canadense*) and the abundance of sub-species of hairbell (*Campanula rotundifolia*) and yellow toadflax (*Linaria vulgaris*). Crested larks were present in the camp throughout the whole winter and their twittering song and peculiar gait often caused us amusement. The

opportunities for studying birds were far greater here than in any of the previous camps, owing to the fact that parties of men were allowed out to collect wood for the fires, since no alternative fuel was provided. The licence granted to these parties varied according to the Germans' interpretation of our behaviour at the time. The district round the camp was very wooded and contained a Panzer school and a V2 launching site. During an international cricket match held here, three swallowtail butterflies flew right along one section of the crowd watching the game.

In March, 1945, Stalag 357 was evacuated owing to the proximity of Allied forces driving into Germany. The countryside through which we marched was very pretty, but we were weighed down by an ever-increasing feeling of weakness and exhaustion. This was banished by the sight of British tanks rumbling after the few Germans, who had not had enough sense to go whilst the going was good.

VIII

THE PRESERVATION OF THE LIVING CHLOROPHYLL IN DYING LEAVES CONTAMINATED BY BIRDS' DROPPINGS

BY G. K. W. VOIGT

IN July and August, 1944, newly fallen leaves showing the usual autumn tints were collected from under various trees and bushes in Norwich and it was seen that in a number of them, green spots retaining their chlorophyll remained as "islands" when the rest of the leaf had turned yellow. Further examination showed that wherever the green spots occurred, corresponding patches on the reverse side of the leaf were covered by birds' droppings, mostly consisting of chalky-white fæces but in a few cases of syrupy material apparently from disgorged remains of berries. The leaves affected were chiefly those of birch and lime, but included some of elm, thorn acacia, hawthorn and blackberry. No uninjured leaves were found to have the relict green spots and the phenomenon was clearly connected with the presence of the birds' droppings. No similar observation appears to have been published in any country, but some years ago I collected a few fallen cherry leaves showing the same combination of cause and effect at Neustadt (Odenwald), Germany and these were sent to the Museum of Zoology in Berlin. The Norfolk specimens on which this note is based have been deposited at Norwich Castle Museum.

As a biochemist, I am eager to discover how the reaction of the birds' droppings on the chlorophyll of the leaves can be explained. It will be of interest to review some of the work which has been published from time to time on the preservation of chlorophyll in autumnal leaves by the action of leaf-mining insect larvæ and parasitic fungi.

M. Cornu (1881) described the effect of many kinds of parasitic leaf-fungi in preventing the fading of chlorophyll and compared the condition set up in the leaf-cells with that promoting longevity in certain primitive algæ when in symbiotic partnership with fungi in the form of lichens.

J. H. Wood (1894) gave a hypothetical explanation of the phenomenon as regards leaf-mining caterpillars. He alluded to "the singular power these insects possess of delaying the ripening and death of the part of the leaf they are occupying . . . The leaf shall have put on its red or yellow autumnal tint, it shall even have dropped from the tree, have died and turned brown, but the area in which the larva is feeding will remain alive and green, not merely for days, but for weeks, provided it is not exposed to excessive dryness . . . Looking at one of these green patches, with its margins fading gradually into the surrounding brown area, it is almost impossible to escape the conviction that it is produced by some substance . . . a poison, or . . . a preservative, which, taken up by the sap, is carried to the cells, and being appropriated in its progress gets more diluted and attenuated the further it travels. What this substance may be, whether a secretion specially provided for the purpose and poured out from the mouth of the larva, or possibly some excretory substance present in the frass, I am quite unable to say. At any rate, the whole virtue of the operation seems to be exercised whilst the larva is still young, and once accomplished the life or death of the creature is of little or no consequence." He compared the condition of the preserved green tissues of the leaf, in which a sort of independent life is carried on, to that induced in various plant tissues by gall-making larvæ.

Wood's account seems to be the only notable one on this subject published in Britain and most later authors have accepted his views with only slight modifications. Fr. Cavara (1908) described the same reaction from scale-insects living on chestnut leaves and J. Kochs (1899) published observations of the same kind with regard to coccids on apples, pears, lemons and oranges, in which green spots persisted on the ripened fruits. O. Richter (1915) brought forward more evidence regarding the activity of leaf-mining larvæ and parasitic fungi in prolonging the survival of chlorophyll. C. v. Tubeuf (1916) gave numerous examples of "Green islands inhabited by parasites in fading autumnal leaves."

J. Traeghard (1913) put forward a different explanation of the phenomenon, based upon the fact that many green patches associated with leaf-mining larvæ are separated from the rest

of the leaf by the larval galleries; he suggests that this isolation from changes going on in the surrounding tissues is sufficient reason for the retention of the green colour. This explanation cannot cover the whole range of "green islands" found on autumnal leaves, in particular those associated with blotch-mines, wounds caused by scale-insects and lesions produced by fungi. Mechanical isolation may intensify and prolong the life of the affected leaf-cells, but it cannot be the real cause of the phenomenon which is purely physiological.

The Norwich material, in which no parasitic organism is involved, may simplify the problem. In the case of normal "green islands" there is interaction between the living leaf and the living parasite, involving injury to the leaf tissues through feeding and growth, and the presence of excretions and secretions derived from the parasite and taken up by the leaf into its osmotic stream.

The birds' droppings are not injurious to the leaf, but they may have a certain chemical effect, either slightly irritating or fertilizing the tissues. Apart from this, the leaf is coated and some of the light is absorbed. Which of these possible effects brings about the preservation of the chlorophyll can only be decided by experiment; as there is no mechanical injury in this case, the reaction must be biochemical only and to some extent hormonal. On the other hand, I have carried out in the autumn 1934 experiments (unpublished) in injuring, by means of cuts, punch-holes and pin-pricks, the leaves of forty-two species of trees and bushes, the leaves being left on the plants until the general fading of chlorophyll had reached an advanced stage; the results have shown that it is possible to produce green patches artificially in this way on a number of species, but the area and intensity of the green colour varied and was never very remarkable.

Further investigations must show how many factors, mechanical, chemical and biochemical must come together to produce green spots of the intensity seen in association with leaf-mining larvæ. Certain larvæ producing ample frass in their mines sometimes cause intense chlorophyll-preservation in surrounding uninjured tissue, the frass itself being of a deep green colour. It seems most probable that there is a substance in the frass and the birds' droppings, which acts as a preservative of the green colour and the life of the chloroplasts.

IX

FLORA AND FAUNA OF NORFOLK

MISCELLANEOUS OBSERVATIONS

Compiled by E. A. Ellis

Plant Records—The gold-of-pleasure (*Camelina sativa* Crantz) was found growing with trefoils and rye-grass in a hayfield at Frettenham in May (W. Field). A single large plant of *Trifolium resupinatum* L. was flowering in a field of trefoil at Upper Hellesdon, May 22nd; this appears to be a newcomer to the Norfolk flora, almost certainly introduced with farm seed. Slender bird's-foot trefoil (*Lotus tenuis* W. & K.) was seen growing in several places on the walls of Breydon and the lower Bure near Great Yarmouth in July; it seems to favour the sunnier slopes of these banks built of salty alluvial mud. Great burnet (*Poterium officinale* A. Gray) must be considered a rare plant in this county nowadays; Mr. W. Field reported it from Crostwick Common in 1945. Lesser wintergreen (*Pyrola minor* L.) was seen flowering in a wood at Haynford in May and June and colonies of *P. rotundifolia* L. were found persisting at Upton Broad and near Heigham Sound later in the summer. Typical plants of the hairy rupture-wort (*Herniaria hirsuta* L.) were found growing over waste ground in gravel pits at Frettenham by Mr. W. Field in May, 1945; this is almost certainly another recently introduced alien species; I believe, however, that a small specimen collected from a gravel pit at Horstead by Miss Patteson in 1917 and queried as *H. glabra* should really be referred to *H. hirsuta*. One of the less common water-figworts, *Scrophularia alata* Gilib. was found at Stanford Water, West Norfolk, and birthwort (*Aristolochia clematitis* L.) established in a hedge at Sturston, both by A. E. Ellis. A fasciated specimen of yellow loosestrife with flattened stem and congested inflorescence was seen at Wheatfen Broad (E. A. E.). Mr. R. P. Libbey found red clover attacked by dodder (*Cuscuta trifolii* Bab.) near Diss in the summer of 1945; the alien dodder recorded from carrots

in Norfolk last year has now been determined by Prof. T. G. Yuncker as *Cuscuta campestris* Yuncker (=*C. arvensis* var. *calycina* Engelm. *C. pentagona* var. *calycina*).

Norfolk Rust Fungi.—*Puccinia arenariæ* (Schum.) Wint. was found on glaucous marsh stitchwort at Hickling and Burntfen Broads, July and August; *P. bullata* (Pers.) Wint. on milk parsley at Strumpshaw, Hickling Broad and Martham; *P. ambigua* (A. & S.) Lagh. on goosegrass in marshy localities at Blofield, Ranworth, Burntfen Broad, Horsey Mere and Hickling Broad; *P. antirrhini* Diet. & Hol. very prevalent in September, killing off beds of snapdragons in many parts of the county; *P. obscura* Schroet. with clustercups abundant on common daisy at Derby Fen, Grimston, in September; *P. cladii* Ell. & Tr. with uredospores on hundreds of plants of *Cladium mariscus* near Swim Coots at Hickling Broad and at Martham—no teleutospores were found and the rust was heavily parasitized by the sphæropsid fungus *Darluca filum*. *Uredo glyceriæ* Lind was found infecting a salt-marsh grass, *Glyceria procumbens* Dum. growing on mud behind the north wall of Breydon, near Great Yarmouth, in August 1945. *Uromyces geranii* (DC.) Otth. & Wartm. was abundant on round-leaved cranesbill near the railway at Haddiscoe and Brundall; *U. genistæ-tinctoriæ* (Pers.) Wint. was seen on petty whin at Derby Fen and on wild broom at Bradeston Hills, Brundall, in autumn; *U. loti* Blytt. was common on bird's-foot trefoil at Derby Fen. Aecidia of *U. scirpi* (Cast.) Burr. were present on parsley-leaved water dropwort (*Oenanthe lachenalii*) on ronds beside the river Bure at Herringby, July 8th, but absent from sea-milkwort in the same place: *Glaux* is the usual aecidial host for this rust on the East Coast, but strains showing a preference for other plants, chiefly Umbelliferæ, have been found on a few occasions: thus, aecidia were on water-parsnip (*Sium erectum*) on Walton marshes, Suffolk, but not on the *Glaux* present there, in July 1945 and the hemlock water-dropwort (*Oenanthe crocata*) has been recorded as an alternative host in Cornwall and Scotland. (E. A. E.).

Rust on Summer Chrysanthemums—Uredospores of a bright orange-yellow colour, resembling those of the common groundsel-rust, *Coleosporium senecionis* (Pers.) Fr. appeared on fifteen plants of " chameleon " summer chrysanthemum (*C. carinatum*) grown from seed sown outdoors in my garden at Brundall, in August, 1945; owing to the absence of frost, the plants went on flowering until December and the rust formed a few teleuto-sori of *Coleosporium* type on one plant late in the autumn. I tried to innoculate ten " clean " plants of the chrysanthemum with uredospores from groundsel in September, but the result was negative; the plants may be susceptible to attack only while they are young. No rust appears to have been seen on *Chrysanthemum carinatum* previously in Great Britain. E. A. E.

Noteworthy Smut Fungi— the following records refer to a few uncommon Ustilaginales and to unusual hosts for two common ones in Norfolk. *Ustilago violacea* (Pers.) Rous. fills the anthers of various flowers of the pink and chickweed family (Caryophyllaceæ) with its purple spore-masses; it is frequent here on red and white campions, ragged robin and lesser stitchwort; recently Dr. P. R. Buckton sent me specimens of the berry-bearing campion (*Cucubalis baccifer* L.) from Merton Wood and some of these were found parasitized by this smut. *Entyloma fergussoni* (B. & Br.) Plowr. produces circular pale spots on the living leaves of wild and cultivated forget-me-nots; although it has been collected only a few times in Britain, it appears to be of rather general occurrence in the Yare Valley, on *Myosotis palustris* and *M. cespitosa*, usually where the plants are partially shaded by trees (localities include Whitlingham, Bramerton, Brundall and Wheatfen Broad). Lady's bedstraw growing on the south denes at Great Yarmouth is often curiously stunted and mis-shapen in growth as the result of attack by the smut *Melanotænium endogenum* (Unger) de Bary; affected plants have close whorls of yellow-green leaves and look as though they might be a distinct species at first. Many dwarfed plants of field speedwell (*Veronica arvensis*) growing on dry slopes of

Bradeston Hill, facing south, were found with the blue-black spores of *Schrocteria delastrina* (Tul.) Wint. issuing from their opening capsules on June 21st, 1945; this fungus has been noticed only twice before in Britain: first by Plowright, near Fakenham, Norfolk, June 20th, 1889, in capsules of *Veronica arvensis* on a wall at Hempton Green. (I am indebted to Mr. T. Petch for looking up the original entry in Plowright's notebook) and more recently by L. E. Hawker, on *V. arvensis* at Peppard Common Oxfordshire, May, 1943. *Urocystis anemones* (Pers.) Wint. commonly distorts stems and leaves of creeping buttercup, forming pustules full of sooty chlamydospores; it affects other plants of the *Ranunculus* family, notably the wood anemone, but I have yet to see it on the latter in Norfolk; it parasitizes winter aconite (*Eranthis hyemalis*) in gardens at Eaton and Horstead Mill House every year; Mr. R. M. S. Brown found it on lesser celandine at Whitlingham Lane. *Urocystis junci* Lagerh. previously unrecorded in Britain, was found attacking a jointed-rush (*Juncus sylvaticus* Reichb.) at Burntfen Broad, August 2nd, 1945; specimens submitted to Dr. G. C. Ainsworth were found to compare well with authentic material in the Kew Herbarium.

E. A.E.

Medicinal Leeches—On September 26th, 1945, Mr. R. P. Libbey and I visited Derby Fen, Grimston, where shallow water was lying in a boggy part supporting a growth of bladderworts, sundews, sphagnum, etc. On wading through the shallows, we disturbed a number of leeches, which became violently agitated and began swimming about; two of them attached themselves to my gum boots and were found to be *Hirudo medicinalis* L., now a rare animal of moorland pools in this country. The fen is regularly grazed by horses and sheep and no doubt the leeches get an occasional feed from them when they go down to drink. E. A. E.

Amphipods—A "sandhopper" (Talitridæ) which lives on the banks of the river Yare at Brundall, where it was first noticed by Mr. E. A. Ellis, has been identified by Mr. D. M. Reid as *Orchestia bottæ* Milne-Edwards, a widely distributed species which has been recorded from Germany,

Holland, Belgium, France, Italy, Cyprus, Palestine, the Black Sea, the Red Sea, East and South Africa. It has only recently been discovered in this country, by the Thames at Richmond (Proc. Linn. Soc. Jan., 1944, p.79). Dr. Isabella Gordon states that *O. bottæ* is the most terrestrial species of its genus. A description will be found in Chevreux & Fage, "Amphipodes," Faune de France, ix, 1925, p.276, fig. 286. Amphipods collected nearer the sea, on marshes by Breydon Water, were determined by Mr. Reid as *Gammarus duebeni* Lillj. and *Orchestia gammarella* (Pallas). In vol. xv of these *Transactions*, p. 298, it was stated that *Gammarus pulex* (L.) lives at Wheatfen Broad. Specimens subsequently submitted to Mr. Reid were named by him *G. zaddachi* Sexton, a species which ranges from almost pure sea water to fresh water. A useful synopsis of the Gammaridæ by D. M. Reid was published by the Linnean Society in 1944...

A. E. Ellis.

Harvestmen—On the sand dunes at Winterton the following species occur at the base of the tufts of marram grass: *Phalangium opilio* L., *Opilio parietinus* (De Geer) and *Oligolophus agrestis* (Meade), the last being particularly common and living right down at the extreme seaward limit of the marram. Attention is drawn to the Synopsis of Opiliones by T. H. Savory published by the Linnean Society in 1944. A. E. Ellis.

Immigrant Dragonfly—Specimens of the yellow-winged dragonfly *Sympetrum flaveolum* L. were taken by Mr. J. A. Riley at Barton Broad (with *S. sanguineum* and *S. striolatum*) on August 3rd and at Alderfen Broad (with *S. striolatum*) on August 19th, 1945. Previously only one example of this species had been recorded "off the Norfolk Coast" in 1912, although the insect is an occasional immigrant in fair numbers in southern England. Mr. A. E. Ellis made the following observations on *S. flaveolum* at Alderfen in late August: "*Sympetrum flaveolum*, though closely resembling *S. sanguineum* in appearance, except for the orange or yellow patch at the base of the hind wings, has more the habit of *S. danæ* in flight, and is fairly easy to recognise on the wing. According to my observations at

Alderfen, it prefers the *Juncus subnodulosus* fen away from trees, and does not wander far. All the individuals I saw were on a small area of fen on the northwest side of the broad. *S. flaveolum* likes sunning itself, especially on patches of rushes which have been beaten down, but does not seem to share with *S. sanguineum* and *S. striolatum* the habit of perching on trees. These last two species frequently fly up into the alders, and are fond of basking on bare twigs, dead branches, fences, gates and bare ground, but I did not observe *S. flaveolum* doing this."

Woodlice—Norfolk records made in 1945 include the following:—*Porcellio dilatatus* Brandt with *P. scaber*, *Philoscia muscorum* and *Oniscus asellus* at Sturston Hall; with *P. scaber*, *O. asellus* and *Androniscus dentiger* Verhoeff (*Trichoniscus roseus* Sars) at Buckenham Tofts Hall. *Porcellio spinicornis* Say, with *P. scaber* and *O. asellus* at Tottington. *Porcellio scaber* Latreille: on the coastal dunes at Winterton, the prevalent form of this species is of a sandy colour speckled with black; is this an instance of protective coloration, or a direct effect of the dry environment inhibiting the normal formation of black pigment? Young individuals are usually pale in colour, but become dark slate-grey when adult. *Platyarthrus hoffmannseggii* Brandt: Sturston Hall and Thunder Lane, Thorpe (garden). *Ligidium hypnorum* (Cuvier): bank of river Yare at Postwick. A. E. Ellis.

Leek Moth—Mr. R. Kemp found leeks on allotments at Great Yarmouth heavily infested by caterpillars of *Acrolepia assectella* Zell. in the autumn of 1944 and discovered others later in the north-east Norfolk and the Norwich district. This insect pest had not been noticed previously in this county.

Toad's Late Spawning—On October 25th, 1945, I heard common toads croaking by the lake at Hethersett Hall, during a spell of mild weather ("St. Luke's summer"). In the third week of November I found numbers of the tadpoles in the lake and some of these were removed and taken to Norwich Castle Museum on 25th November, where they went on developing slowly through the winter; I fear that herons probably ate the rest.

H. W. Back.

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H.M. THE KING

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President-elect

THE EARL OF LEICESTER

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Hethersett Hall, Norwich.

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Castle Museum, Norwich

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Committee

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(to retire 1949)

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E. L. SWANN
(to retire 1948)

G. J. COOKE
B. B. RIVIERE
D. PEARCE GOULD
(to retire 1947)

Ex-officio: MISS G. V. BARNARD

NEW MEMBERS, CHANGES OF ADDRESS, etc.

NEW MEMBERS ELECTED IN 1946.

Adlam, Miss P., 122 College Road, Norwich.
Ali, Miss E. M. S., 60, Beaconsfield Road, Norwich
Billington, A. E., 309, Dereham Road, Norwich
Billington, Mrs. A. E., 309, Dereham Road, Norwich
Brereton, J., Brampton Hall Farm, Brampton, Norfolk
Brooks, Basil, Burghsted Lodge, Billericay, Essex
Bunney, M., A.R.I.B.A.
Buxton, John, Horsey Hall, Gt. Yarmouth
Cator, Peter, Hoveton House, Norwich
Cator, Mrs. P., Hoveton House, Norwich
Clarke, Miss D. M., Hempnall, Norfolk
Cozens-Hardy, Miss Ann, Glavenside, Letheringsett, Holt
Duffield, Mrs., Buxton, Norwich
Edwards, Miss N. F., 106, Priory Road, West Hampstead, N.W. 6
Euren, Miss, 20, Recreation Road, Norwich
Euren, Miss M. D., 20, Grange Road, Norwich
Fisher, James, The Old Rectory, Ashton, Northampton
Fletcher, Hugh N., Bracon Lodge, Braconash, Norwich
Fraser, Miss Margaret, 224, Unthank Road, Norwich
Gowing, Cecil, Rackheath, Norwich
Hancock, S., Coltishall House, Norfolk
Hare, Mrs., The Paddock, Meadow Lane, Thorpe, Norwich
Harrison, G. C., 68, Earlham Green Lane, Norwich
Hartley, Mrs., Lynndale, North Elmham, Norfolk
Hutchings, G. E., Ministry of Town and Country Planning, Cambridge.
Ives, Robert, By-way, Cromwell Road, Cromer
Jessup, George, Dereham Road, Watton
Johnson, A. E.
Jones, Mrs. G. M. Kinlock, 4, Oak Lodge, Thorpe Road, Norwich
Jones, R., B.Sc., Ingleby, Telegraph Lane, Norwich
Lloyd, Major J. D., Warren Cottage, Euston, Thetford
Lyon, Kenneth, C.B., C.B.E., The Old Barn, West Runton, Norfolk
Marsham, Miss, The Rectory, Stratton Strawless, Norfolk
Maxwell, Major, Ministry of Town and Country Planning, Cambridge
Mills, J. Weston, 129, George Borrow Road, Norwich
Morgan, Dr. G. W., Harbour Cottage, The Green, Brancaster Staithe, Lynn
Mosby, Dr. J. E., St. Omer, Cringleford, Norwich
Moss, Miss B., B.Sc., Potter Heigham, Gt. Yarmouth
Palmer, Miss D. G., 20, Grange Road, Norwich
Payne, Rev. H. J., Gt. Melton, Norfolk
Payne, Mrs. H. J., Gt. Melton, Norfolk
Pfob, Mrs. L. M., Hill House, Little Melton, Norwich
Purdy, Capt., Saxthorpe Hall, Norfolk
Ribbons, B. W., Norwich
Robinson, Mrs. G. F. B., 240, Unthank Road, Norwich
Rogers, Lt.-Col. G. J., The Lighthouse, Winterton
Rogers, Mrs. G. J., The Lighthouse, Winterton

NEW MEMBERS ELECTED IN 1946—*continued.*

Rounce, J. N., Field House Farm, Binham, Fakenham, Norfolk
Sewell, Miss Honor, Old Buckenham Hall, Norfolk
Silverwood, J. H., The Vicarage, Gt. Plumstead, Norwich
Smith, Dennis H., Tharston, Norfolk
Sole, Miss E., Cherry Garth, High Kelling, Norfolk
Spooner, T. A., 9, Newton, Thetford
Stuart, Alan, Red House, Stoke Holy Cross, Norwich
Sword, C. T., Watton, Norfolk
Taylor, James, Victoria House, Blisworth, Northants
Thompson, Ian M., 147, Harley Street, London W.1.
Thouless, Miss, Mill House, Buxton, Norwich
Tydeman, Miss M., Norwich
Warren, A. J., 175, Colman Road, Norwich
Waters, D., 28, Robingoodfellows Lane, March, Cambs.
Weston, Miss F. M., 1, Muriel Road, Norwich
Wiseman, Miss H., 135, Newmarket Road, Norwich

CHANGES OF ADDRESS.

Barrington, F. J. F., 52, Harley Street, W.1.
Barry, Miss
Brotherton, Miss H. J., Burnage House, Martello Park, Canford Cliffs, Bournemouth
Bradfer-Laurence, H. L., F.S.A., Sharrow End, Ripon, Yorks.
Buxton, R. G., Wiveton Hall, Holt, Norfolk
Cazenove, Mrs., The Old Manor, Ham, nr. Shepton Mallet, Somerset
Cozens-Hardy, B., Glavenside, Letheringsett, Holt, Norfolk
Digby, P. S. B., 199, Coleridge Road, Cambridge
Ellis, E. A., Wheatfen Broad, Surlingham, Norwich
Ellis, M. B., Imperial Mycological Institute, Ferry Lane, Kew, Surrey
Howlett, Dr. J. K., Links Tor, Hunstanton, Norfolk
Lambert, Miss J. M., Toft Monks, West End Avenue, Brundall, Norwich
Libbey, R. P., Prospect Cottage, Eldwick, Bingley, Yorks.
Long, Mrs. G. V., Endacre, Millington Road, Cambridge
Maples, A. K., 33, London Road, Spalding, Lincs.
Meade, Miss P., 4, Tenison Avenue, Cambridge
Meicklejohn, Mrs. R., Arcady, Cley, Holt, Norfolk
Noble, Miss E., White House, Saham Toney, Thetford
Riviere, B. B., F.R.C.S., Salhouse Lodge, Norwich
Squirrell, Mgr. Canon H. S., Poringland, Norwich

MEMBERS LOST BY DEATH.

Mr. Russell Colman, Mr. G. J. Cooke, Mr. W. H. B. Fletcher, Canon N. W. Paine, Mr. Hugh Wormald.

NORFOLK AND NORWICH NATURALISTS SOCIETY, 1945-46.

GENERAL ACCOUNT.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
April 1st, 1945			By Transactions		102 7 6
Balance as per a/c Barclays Bank		4 5 1	Library Rent		6 5 0
Balance East Anglian Trustee Bank	95 18 7		Donation to Hickling Purchase Fund		50 0 0
Do. Interest	2 7 6		Assistant Secretary, Honorarium and Expenses		10 18 8
		98 6 1	Sundry expenses—		
Subscriptions		138 3 7	Lecture Fee	3 3 6	
Do. Publication Fund		11 0	Stationery and Printing	7 2 2	
Sale of East Anglian Flora	15 8		Postages (Hon. Sec's.)	2 1 6	
,, Transactions	1 8 0		(Hon. Treasurer's)	1 2 8	
		2 3 8			13 9 10
Interest on Investments		9 13 8	Insurance		13 6
			Cheque Book		10 0
			Balance Barclays Bank	20 12 6	
			Balance East Anglian Trustee Bank	48 6 1	
					68 18 7
		£253 3 1			£253 3 1

LIFE MEMBERSHIP ACCOUNT.

	£ s. d.		£ s. d.
To Balance April 1st, 1945	83 7 7	By Balance on East Anglian Trustee Bank	127 11 7
,, Life Subscriptions (five)	40 0 0		
,, Interest on Investment	1 15 0		
,, Interest East Anglian Trustee Bank	2 9 0		
	£127 11 0		£127 11 7

LIBRARY ACCOUNT.

	£ s. d.		£ s. d.
To Balance April 1st, 1945	46 5 1	By purchnses Entomological Society	1 0 0
,, Interest East Anglian Trustee Bank	1 3 1	,, Donisthorpe's British Ants	5 0
		Balance East Anglian Trustee Bank	46 3 2
	£47 8 2		£47 8 2

I have audited the above Accounts and find them correct.

C. R. A. HAMMOND,
Hon. Auditor
23rd April, 1946.

I

HON. SECRETARY'S REPORT

During 1945-46 the following meetings were held at Norwich Castle Museum. November 20, 1945 :—exhibition of specimens and discussion of plans for the Society's future activities. December 18, 1945 : notes on " Broadland Topics " contributed by several members. January 22, 1946 : lantern lecture " Round the Year with Nature " by Mr. H. J. Howard. February 19, : lecture, with coloured slides, " A Naturalist in Corsica " by Mr. John Armitage. March 19 : a talk on " Phenological Work in Britain " by Major H. C. Gunton. April 27 : Annual Meeting at which the retiring President, Mr. H. W. Back delivered an address on " Farming Friends and Foes " and officers were elected to serve in 1946-47, as follows :— President, Mr. R. G. Buxton ; President-elect, the Earl of Leicester ; Vice-President, Major A. Buxton ; Hon. Auditor, Mr. C. R. A. Hammond ; Hon. Treasurer, Mr. G. F. B. Robinson ; Hon. Secretary, Mr. H. W. Back ; Committee : Miss C. E. Gay, Messrs. H. J. Howard, E. T. Daniels and R. Hinde in the places of members retiring by rotation.

An excursion to Blakeney Point was held on July 21 and was attended by seventy-two members and friends.

Sixty-three new members were elected in 1946.

II

THE JUNIOR BRANCH OF THE NORFOLK AND NORWICH NATURALISTS' SOCIETY

Annual Report, 1946

The Junior Branch is primarily intended for those young people who being at School or College are unable to attend the Meetings of the Senior Society, but others interested, up to and including College age, are eligible.

The Annual Subscription is 2s. 6d. payable in January of each year.

The present membership numbers 101 which includes :— old members 64, new members 25, adult members 12.

Owing to transport difficulties and the illness of the Hon. Secretary, only two meetings were held in 1946. But now that the war is over, it is hoped to develop the activities of the Society and hold more meetings during the three School holiday periods of each year.

In future adults will not be admitted as members of this Society, neither will parents or adult friends be included in the Societies' expeditions. When necessary, a bus will run from Norwich, members and friends being asked to travel by this transport under the care of the Secretary ; the cost being payable in advance, can be kept to a nominal fee.

January 3rd, 1946.—18 members and friends spent an instructive day at the Taverham Silver Fox Farm, by invitation of Mrs. and Miss Ann Carr. Thanks to the assistance of Mr. E. A. Ellis, a large number of plants, insects, fungi, and mosses were found by members in the adjoining woods. The day ended with a Victory tea after a tour of the Silver Foxes, and a fascinating talk from Mrs. Carr.

January 9th, 1946.—38 members and friends met at the Castle Museum by permission of the Curator. A competition on " The Norfolk Room " was keenly contested, followed by an exhibition of specimens collected by members.

It is the aim of this Society, to encourage it's members to keep records of personal observations, in any branch of Natural History. It is hoped to arrange expeditions to the Naturalist Society's Sanctuaries in the County, and to visit parks and gardens ; together with a stay of several days in the Spring holidays of 1947 at some interesting centre in Norfolk.

The Hon. Secretary (new address, 4, Tenison Avenue, Cambridge), will be pleased to supply further particulars, to obtain answers to queries or receive suggestions for future work.

BALANCE SHEET for year ending, September 30th, 1946.

Receipts.	£	s.	d.
Balance from 1945 Account ...	5	17	11
63 members' subscriptions at 2/6	7	17	6
	£13	15	5

Expenditure.	£	s.	d.
Subscription to Norfolk Wild Birds Protection Society ...	1	1	0
Bus to Silver Fox Farm, Taverham	2	10	0
Tea at Taverham	3	15	0
Tea at Castle Museum	2	12	6
Tips		12	6
Postages		15	11
Typing Notices, Stationery, etc....		14	4
Error made by Post Office in respect of interest allowed ...		13	2
Balance in hand as per Post Office a/c.	1	1	0
	£13	15	5

Patricia H. I. Meade,

III

PRESIDENT'S ADDRESS

FARMING FRIENDS AND FOES.

Presidential Address delivered by Mr. H. W. Back to the members of the Norfolk and Norwich Naturalist's Society, at Castle Museum, Norwich on April 27th, 1946.

We all know that there is a world shortage of food today as a result of the war, but how many people realised that there was a world shortage of food before the war, that millions of people were not getting sufficient food to keep them reasonably healthy, and that if we now want to build a new world that is free from hunger, the peoples of the world will have to grow something like 20% more grain than was grown before the war, and will have to increase the production of meat, milk, fruit and vegetables by 100% to 200% over what it was before the war. This is no easy job, in fact it is by no means certain that the land can produce the quantity of food really needed.

From very early times man recognised that there was a relationship between wild birds and animals and his crops. There is no doubt that some species are beneficial while others are injurious, but many which are injurious at one season may be beneficial for the rest of the year. If certain beneficial birds are permitted to increase too much there is a tendency for them to become partly injurious owing to insufficiency of their natural food to supply their increased numbers.

In determining the economic status of any wild bird which in the adult state may feed upon both animal and vegetable matter, it must be remembered that during the nesting season it feeds its young almost entirely on soft foods principally slugs, worms, caterpillars and insects, which being numerous at that season of the year also constitute the main food of the pareuts. Not until recent years have the foods of our birds been scientifically studied, and few reliable statistics have been available.

The subject is a very intricate one, and until Dr. W. E. Collinge published his study made from 1924—1927 on his

examinations of the food consumed by some 70 kinds of British birds, there was little reliable information as to what they really ate, and as to whether a particular bird was on the whole beneficial or injurious to agriculture.

The damage done to crops by birds and animals is far more easily recognised and assessed than are the benefits which they confer, and without knowledge of the foods consumed by any bird or animal throughout the whole year it is not possible to say for certain, whether it should be placed on the beneficial and therefore protected list or outlawed as injurious and reduced in numbers. Never have the farmers of Britain been called on to produce so much food for man and beast as now. From the beginning of the war an intensive cropping campaign has resulted in more acres of our land coming under the plough than ever before. This means that many acres of waste and partly derelict land have been cleared, cleaned of weeds and recovered to the plough, thereby depriving many birds of their favourite feeding grounds or nesting places.

It is of primary importance that everything that nature has provided to assist man in his cultivations to grow this extra food should be given every encouragement, and conversely any bird, animal or insect which according to its diet throughout the whole year can be regarded as harmful to our crops should be destroyed. The question therefore to be decided is which of our birds and animals are beneficial to agriculture and horticulture, and which are harmful.

The answer can only be attained by an accurate survey and knowledge of what they feed on through the whole year. This with few exceptions is impossible to assess with accuracy, and unless arrived at scientifically may be misleading. Mere opinion based on casual observation is not good enough. To deal with the matter scientifically is a very laborious task entailing microscopic examination of the food contents in the birds' intestinal tract throughout all the months of the year and from various districts. This has been done by Dr. Collinge and I will give you the results of some of his minute examinations.

There are many species of birds which do damage to both agricultural and horticultural crops at certain seasons, but these same birds in the breeding season feed their young on vast quantities of injurious insects and caterpillars which might well

do more harm to our crops, if not destroyed, than is done by the parent birds themselves.

How are we, the ordinary people of the countryside, perhaps more interested in the sight of wild birds than in their mixed feeding habits, to decide which species are (1) our friends, (2) our foes? The principal foods of our smaller birds consist of (1) insects, (2) seeds. The kinds of food eaten by birds are related to the forms of their bills, just as the diet of a mammal is related to the structure of its teeth. The grinding molars of the horse and cow ask for forage which they can chew. The molars of the wolf and cat with their sharp ridges ask for flesh which they can cut into shreds. Similarly a bird's bill asks for hard seeds that it can crack and open or soft grubs and insects which only require to be crushed before they are swallowed, insectivorous birds have slender delicate bills. Those living on seeds (graminivorous) have strong conical beaks. Between the two extremes are those with intermediate bills, living on a mixed diet of insects, seeds, grubs, berries, slugs and snails, etc.

No doubt the insectivorous birds destroy enormous numbers of injurious insects, and they should be placed first on the list of our friends in agriculture and horticulture. Among them are those which devote themselves to searching for insects and their eggs and larvæ in the cracks and crannies of bark of trees, behind ivy on walls, in heaps of dead leaves, etc. These birds are favoured with a specially keen eye and usually have a slender tapering beak, their wings are not usually large since no chasing is required in their form of hunting. In this class, I put all tits, wrens, tree creepers, woodpeckers and nuthatches.

Next come those which devote themselves to the actual chase in the air of moths, beetles, flies, gnats, daddy-long-legs and other insects. These require a short bill with a large mouth in which the prey is snapped and engulfed immediately without the chaser slackening speed or having to perch to deal with its captive; they need powerful wings capable of carrying the birds at speed to capture their prey, and of long continuous flight. In this class, I place the swallows, martins, swifts and nightjars. I commend these big mouthed tireless hunters as incomparable helpers in keeping down insects, which would otherwise infest our crops and gardens and even our houses.

Next I make a class of the greatest value, all truly insectivorous birds and some of our most welcome ones, mostly small in size, delicate in shape, and modest in plumage ; these labour in our fields and fences, gardens and woods, meadows and orchards, consuming countless numbers of insects and caterpillars, which, if unchecked, would descend on our crops.

These I specially commend since in addition to their good work in waging war on the insect pests many of them are our most delightful singers. In this class, I place all warblers, (whitethroats, blackcaps, etc.), robins, chats, nightingales, wagtails, flycatchers, hedge sparrows and pipits. All the insectivorous birds so far mentioned are of inestimable value to man in helping to keep down the insect pests and are worthy of the greatest support and protection we can give them.

Now I turn to the graminivorous birds, whose principal diet is the seed of weeds growing in our crops, fences and waste places. These weeds, if their seeds were not consumed by the birds, would invade our crops in far greater numbers than they do now. At times these birds cause damage to crops, but on the whole they do far more good and must be classified as friends. In this class I place linnets, larks, chaffinches, goldfinches, buntings, redpoles and siskins. The house sparrow, bullfinch, greenfinch and hawfinch are in this class but are listed as foes to agriculture for the following reasons :—

House Sparrow. The loss of cereals caused by sparrows is enormous and it is certainly enemy No. 2 to agriculture, and every endeavour should be made to destroy it at all times of the year. Dr. Collinge examined the stomach contents of 758 adults and 476 nestlings from both agricultural and fruit growing districts with the following result :—

In fruit growing districts	35% of food beneficial
	26% of food injurious
	39% of food neutral
In agricultural districts	5% of food beneficial
	75% of food injurious (cereals)
	20% of food neutral

There are it seems more sparrows in the country than ever before, to a certain extent accounted for by the lack of sparrow trappers during the war, who in earlier days made huge catches

by netting in farm stack yards and around the remaining lumps of seeds, etc. left from threshing operations.

Enormous damage is done by sparrows to standing corn when it is in the ripening stages: they descend on selected fields and alight on the growing straw, which is frequently bent over by their weight, and extract the grain from the ears. At times a vast quantity of sparrows may be seen sitting on a fence adjoining a corn field: they fly continuously to and from the corn, and if alarmed rise in a cloud from the field only to visit the other side to continue their work of destruction. Again, wherever animals are fed, sparrows are always present and steal much of the crushed cereal foods fed to cattle etc. Undoubtedly there are far too many house sparrows, and every effort should be made to reduce the pest. This is no easy matter but all can help by destroying their nests and eggs in the breeding season. Some years ago sparrow clubs were formed particularly in the South of England, and a reward placed on the head of a sparrow, but the Ministry of Agriculture no longer favours this means of controlling the pest since unfortunately other useful birds frequently suffer.

Bullfinch. Its only redeeming feature is its appearance. The damage done to fruit tree buds far exceeds any good it does in consuming weeds.

Greenfinch. Does great damage to germinating seeds particularly in market and kitchen gardens and also to fruit tree blossoms and at times to sprouting corn. The amount of good it does cannot compensate for the damage.

Hawfinch. Does great damage to fruit tree buds and pea crops but is not sufficiently plentiful to cause much worry.

Next comes the class having intermediary bills and living on a very mixed diet, not always entirely helpful to man. Dr. Collinge has proved however that the good work done by them more than outweighs their evil ways, so that on balance we regard them as friends and helpers in agriculture, though not quite such good friends of horticulture. In any case our countryside would be the poorer and our gardens incomplete without them. In this class, I place song thrushes, redwings, missel thrushes and fieldfares. The starling and blackbird are in this class but I must deal with them individually.

The Starling. This bird has increased alarmingly in this country during the last 25 years and although at one time considered a beneficial bird has now become a plague. Originally its food consisted of insects, larvæ, grubs, beetles, flies, slugs and a proportion of wild fruits and berries, but it has now turned its attention to our farm crops of cereals, and cultivated fruits, and the damage done to newly sown corn, especially wheat, when it is just sprouting through the soil, is enormous.

Dr. Collinge examined 386 adults and 134 nestlings prior to 1918 and found the following food consumed :—

	26.5%	Injurious insects, wireworms and larvæ and Caterpillars
	2.5%	Beneficial insects
	3.5%	Neutral insects
	8.5%	earthworms
	6.5%	slugs and snails
	3.5%	miscellaneous
Animal . .	51.0%	
	20.5%	cereals
	2.5%	cultivated roots
	15.5%	cultivated fruits
	7.0%	wild fruits
	3.5%	miscellaneous
Vegetable . .	49.0%	

A summary of these figures shows that, of the food eaten by adult starlings, 36.5% is of benefit to agriculture, 41.0% an injury and 22.5% neutral. For the months of April, May and June, these birds' diet is beneficial to agriculture. From July to October cereals and cultivated fruits form the main items of food amounting to almost 100%.

During the short period of the nesting season the starling amends its ways. Of the total food brought to its young 89.0% consists of injurious insects, 1.5% neutral insects, 6.5% earthworms and slugs and 3.0% miscellaneous, but unfortunately the nesting season only lasts a few weeks.

In conclusion the starling can only be regarded as a foe to agriculture and its numbers should be drastically reduced.

THE BLACKBIRD. It is obvious that of recent years this bird has much increased throughout the Country. We now have too large a resident population, which is from time to time augmented by immigrants. From careful observations it has been confirmed that blackbirds are five or six times as numerous as thrushes.

It is in the fruit growing districts and our kitchen gardens where the depredations of the blackbird take place, and the thieving of fruit of all kinds, strawberries, currants, cherries, raspberries, plums, pears, figs and apples, has grown to serious proportions; heavy loss is also sustained through pecking of fruit before it is ripe. In fruit growing districts it is obvious that fruit is easier to obtain than other food, and in that season the amount of animal food eaten is very little. Dr. Collinge examined 285 Adults throughout the year and 33 nestlings with these results :—

Animal Food 39.0% ..	22.0% injurious insects, Wireworms and beetles
	3.5% beneficial insects
	5.5% neutral insects
	6.5% Earthworms, Slugs and Snails
	1.5% miscellaneous matter
Vegetable Food 61.0%	25.5% cultivated fruits
	2.5% wheat
	2.5% roots
	24.5% wild fruits
	6.0% miscellaneous
	100.0%

An analysis of these foods shews that of the total food consumed, the blackbird is beneficial as to 24.5%, injurious as to 34.0% and neutral as to 41.5%.

So far as agriculture is concerned it therefore appears that the blackbird does more good than harm, but from the horticultural aspect its depredations far exceed its good works

and it must be placed on the black list for destruction, until its numbers have been reduced considerably.

Raptorial Birds. The owls have been much maligned by those who ought to know better, and have consequently been persecuted to such an extent that their numbers have been greatly reduced. They are of inestimable value to agriculture, their principal food being rodents, which cause millions of pounds sterling worth of damage to our food crops while in growth, to the harvested grain when in stack or store, to the manufactured product when in warehouse and shop and to food in our houses. Although protected by law the slaughter of owls goes on.

So important to agriculture are the owls that I propose to give some details in connection with the more persecuted varieties.

1. The Barn Owl. Its chief place of residence is in hollow trees, but it also lives in the dark corners in the roofs of barns, granaries, and other farm buildings, and in church towers. Its principal hunting grounds are our fields and meadows, where it preys on mice and voles, and in our farm yards and on and around corn stacks, where it searches for rats and mice.

In recent years much research work has been done on the pellets ejected by the barn owl.

Mr. L. E. Adams examined 1,124 pellets and found remains of 2,397 rats and mice, 97 sparrows, 120 starlings or blackbirds and 54 small birds.

Seebohm recorded that, in 700 pellets examined, he found the remains of 2,513 mice, 1 mole and 22 birds of which 19 were sparrows.

Dr. Collinge examined 410 Pellets and identified the following:

Mole	5
Field Vole	62
Bank Vole	34
Long Tailed Field Mouse	149
House Mouse	25
Brown Rat	125
Common Shrew	64
House Sparrow	122
Blackbird	11

Starling	12
Thrush	5
Small birds	17
Frog	4
Cockchafers'	81
Beetles	53

In spite of special search for game birds' bones, no trace was found, bearing out what has so frequently been stated that when the barn owl is hunting, the young game birds are safe.

These figures show that rats, mice and voles together amount to 395, house sparrows, blackbirds and starlings 145, cockchafers and beetles 134. The destruction of so many rodent vermin is certainly a service that should win the barn owl protection by all.

2. Tawny Owl. A resident of our more wooded districts and another victim of persecution. Nocturnal in feeding it may frequently be seen in the twilight of morning or evening, returning to or leaving its sleeping quarters, often a thick fir tree. Some people dislike hearing this owl hooting at night and this may have something to do with its bad reputation and consequent persecution. Its principal food is rodents, but it does take a proportion of smal lbirds and also eats small rabbits, worms, cockchafers, and insects, with an occasional raid on the poultry farm or game covert for a chick.

Dr. Collinge examined 127 Pellets cast by this owl with the following result :—

Mole	1
Common Shrew	47
Lesser Shrew	5
Long Tailed Field Mouse	53
Brown Rat	13
Short Tailed Field Mouse	42
Bank Vole	10
House Sparrow	16
Thrush or Blackbird	4
Frog	3

There can be no doubt that the good works of this owl are highly beneficial to the farmer and exceed any damage it may do.

3. Short-Eared Owl. Restricted to marshes and heath and seems to depend for food almost entirely on short-tailed field voles.

4. Long-Eared Owl. Its home is in our thickest woods and it prefers coniferous trees. It is mainly nocturnal but occasionally feeds by day and this gives it a bad name with game keepers. Very little reliable evidence however is forthcoming against it.

There is I think no doubt that an occasional pheasant chick or other bird is taken to vary the usual diet of rats, mice, and voles but so far as agriculture is concerned it is a most beneficial bird, and I plead for its preservation.

5. Little Owl. The smallest member of the family, the male weighing no more than 4-ozs. and the female a little more.

It is mostly nocturnal but can frequently be seen flying by day often surrounded by a mobbing flock of small birds on which it is presumed to feed. Sportsmen and game keepers say that it kills game birds, poultry farmers that it eats their chicks. Others declare that it lives on small birds; in fact no one can speak well of it, and it is considered a most injurious bird and persecuted at every opportunity.

In the early part of the 19th Century it was a very rare visitor to our Islands, though common in Europe. The Rev. F. O. Morris records that a pair bred near Norwich, and two other specimens were authenticated in Norfolk, and one was shot in Northumberland in 1812. It has been suggested that most of the recorded occurences before 1843 are open to doubt. During the next 50 years little owls probably imported from Italy or Holland were liberated by Lord Lilford, in Northamptonshire by Mr. Meade Waldo, in Kent by Mr. St. Quintin in Yorkshire and by Lord Rothschild in Hertfordshire. Evidently some of these introductions flourished, for the little owl is now our commonest owl.

The hen bird lays 4 to 6 eggs and the rate of increase may be very rapid. From 1900—1936 this owl continued to flourish being particularly abundant in some years, but its numbers fluctuated and the persecution to which it was subjected may have been responsible for this, as reports from specimens examined all agree that it is a particularly healthy and well nourished bird and remarkably free from disease.

From these examinations there began to arise a doubt as to whether the diet really contained as many game and poultry chicks and small birds as had previously been stated, and the question of its economic status came to a head. In 1936 and 1937, the British Trust for Ornithology undertook an investigation into its feeding habits, and a special game and poultry chirck investigation from March to July 1937.

During this investigation 73 helpers sent material for analysis from 34 counties and 81 localities, and 2,460 pellets were examined, as well as a large quantity of materials from its nest and living quarters.

Throughout the investigation only a very few instances of depredation amongst game and poultry were confirmed and the food of the little owl was found to consist for the most part of rats, mice and other rodents, insects of various kinds (many injurious to agriculture) worms, frogs and a small percentage of birds, chiefly starlings and sparrows, and to a less extent blackbirds and thrushes.

Dr. Collinge records having examined the stomach contents of 194 adults and 18 nestlings and 260 pellets throughout a year, from 19 different counties with the following result :— Remains of mammals were found during each month in 126 stomachs ; the long tailed field mouse being the most common and found in 86 stomachs, and the short tailed field mouse in 50 stomachs. The house mouse, brown rat, bank vole, common shrew and mole were also found. Remains of birds were found in 35 stomachs with a percentage of game birds .51% and other birds 4.45%—principally house sparrow, starling, misselthrush, blackbird and wood pigeon. Remains of frogs were found in 2 stomachs, but insects constituted the largest bulk of food consumed amounting to 49.24% throughout the year and were found in 179 stomachs : of these insects 30.62% were injurious—mostly wireworms and click beetles, 17.63% were neutral insects principally dung beetles. In addition small quantities of the grey field slug, wood lice and earth worms were identified. The examination of the 18 nestling stomachs revealed that the young birds are not fed on insects and beetles but on their larvæ and earthworms the percentage being as follows :—beetle larvæ 18, earthworms 23, voles and mice 49, wild birds 10, game birds nil.

The examination of 267 pellets revealed the following result :—

53.5%	..	voles and mice
41.0%	..	insects
2.5%	..	young birds
3.0%	..	unidentified matter
100.0%		

After Dr. Collinge's examination over three years we can only come to the following conclusion :—

1. That insects, voles and mice are the main items of food.

2. That the quantity of game and poultry chicks eaten is infinitesimal.

3. That the little owl is of great value to agriculture, through the destruction of farm vermin and crop pests and that its persecution should cease.

I suggest that it is impossible to come to any other conclusion than that owls generaly are of inestimable value to agriculture and that every effort should be made to bring to the notice of their persecutors that they are decidedly friends and not foes. Before leaving the raptorial birds I must refer to some of the hawks.

HAWKS.

1. The Kestrel. Its principal food is field mice and some of the larger insects, grass hoppers, beetles and caterpillars.

Dr. Collinge examined the stomach contents of 80 specimens with the following result of food consumed :—

64.5%	mice and voles
8.5%	sparrows, blackbirds or thrushes
6.0%	nestling birds
16.5%	insects
2.5%	earthworms
1.0%	frogs
1.0%	vegetable matter
100.0%	

The 6% of nestling birds is regretable, and it is probably true that some of these are game birds but all the rest of its prey counts in its favour. It should be remembered that owing to the small size of this hawk, and the short period during which it would take game or poultry chicks, the numbers taken would probably be small.

There can be no doubt whatever that the good work done in the destruction of mice alone far outweighs the damage and that these birds should be given protection at all times, as one of our most beneficial birds.

2. Sparrow Hawk. This bird, hated by the game preserver and poultry farmer, is much persecuted, but let us consider its real economic position. Dr. Collinge examined the stomach contents of 109 specimens with these results :—

16.5%	game birds ..	} 41.5% injurious to Nature
9.5%	poultry	
6.5%	ducklings	
4.5%	insectivorous birds	
4.5%	beneficial insects	
19.5%	blackbirds and sparrows, and Wood pigeons	} 41.0% of benefits
15.0%	injurious insects	
6.5%	mice	
5.5%	neutral insects	} 17.5% neutral
9.5%	miscellaneous matter	
2.5%	vegetable matter	
100.0%		

The harm done by this hawk undoubtedly outweighs the benefits it bestows, but probably not to the extent imagined by game keepers. On balance however, it does more harm than good, and therefore should be kept within strict limits.

THE CROW FAMILY.

1. The Rook. None of our birds has been the subject of greater contraversy, and very divergent opinions are held of the rook and according to how he varies his diet he is called alternatively a friend or foe to agriculture.

He follows the plough and picks up large quantities of wire worms (the larvæ of the click beetle), leather jackets and weevils, some of the most obnoxious pests with which farmers have to contend and which are extremely difficult to eradicate, but this good work can only go on during ploughing seasons.

At other times of the year the rook has to live and he changes his diet to cereals and frequently does a great deal of harm in digging up with his powerful beak the sown grain. Just when it sprouts through the ground, rooks will, if not checked, work along the line of the drill and pull up and devour or destroy much of the crop. Also at harvest time if they can find an unguarded field of corn in shock they will descend on it and eat or destroy vast quantities. Everyone must have seen a corn stack, with wind damaged roof, literally covered with rooks stealing the ears of corn, which they carry off and devour all over the surrounding land. Another favourite food is potatoes which they will eat greedily if they can dig up the young growing tubers.

Dr. Collinge during the years 1913 to 1916 examined the stomach contents of 1,306 rooks with the following results :—

Animal Food 41.0% ..	23.9%	injurious insects, wire-worms, leather-jackets and weevils
	3.5%	beneficial insects
	4.6%	neutral insects
	4.4%	earthworms
	3.2%	slugs, snails and millipeeds
	1.4%	eggs and young birds
Vegetable Food 59% ..	35.1%	Cereals
	13.4%	potatoes and roots
	4.4%	seeds
	6.1%	miscellaneous
	100.0%	

An analysis of this food figure shows :—

52%	was injurious to agriculture
28%	was beneficial to agriculture
19.5%	was neutral to agriculture
100.0%	

Before pronouncing his verdict, Dr. Collinge made this interesting calculation, on the assumption that every rook eats one pound of food per week. Ten thousand rooks eat 232 tons in one year and in so doing they destroy :—

80 ton of cereals
32 ton of potatoes and roots
7½ ton of beneficial insects
65 ton of injurious insects, slugs and smails.

The question arises whether, if this number of injurious insects had not been destroyed, the insects would have destroyed more cereals, potatoes and roots than the rooks.

I do not propose to hazard an answer since the whole status of the rook is now the subject of a scientific investigation by the British Trust of Ornithology at the request of the Ministry of Agriculture. It is probably true that through the felling of trees formerly used as rookeries, existing colonies of rooks have increased, and that they are now too numerous in such places, and consequently have changed their feeding habits for the worse. Moreover the advent of the tractor plough which exposes the verminous insects travels too fast for the rooks to pick out anything like the proportion of grubs, wireworms, etc., which they did when following the horse plough. This seems to be proved by the vast numbers of wireworms now present in our land, which have done more damage of recent years since the ploughing of so much grass land. The wireworm population has been counted in a large number of our fields and graded as follows :—

Low up to 300,000 wireworms per acre
Moderate up to 600,000 wireworms per acre
High up to 1,000,000 wireworms per acre
Very high up to 1,500,000 wireworms per acre

There is plenty of rook food.

2. Jackdaw. During the last few years this bird has increased enormously. In the nesting season there are no longer sufficient holes in our trees to accommodate them and they have taken possession of many old hollow trees hitherto the home of owls ; they also make use of old pigeon's nests and even make nests of their own, principally in fir trees. This bird has a very bad reputation and is generally regarded as an inveterate thief of eggs.

Dr. Collinge examined 48 stomachs and found that food consumed during the year consisted of :—

71.5% Animal Food ..	39.5%	injurious insects, cockchafers, wireworms and beetles
	2.5%	beneficial insects
	8.5%	neutral insects
	4.5%	slugs and snails
	3.5%	earthworms
	2.0%	eggs
	2.0%	young birds
	9.0%	spiders, millipeeds, ticks, woodlice, frogs and mice.
	71.5%	
28.5% Vegetable Food	8.5%	wheat
	2.5%	potatoes
	2.5%	fowls' food
	3.0%	fruit
	5.5%	weeds, seeds and fruits
	6.5%	miscellaneous
100.0%	28.5%	

Summary of food consumed :—

48.5%	beneficial
28.5%	neutral
23.0%	injurious
100.0%	

In conclusion the Jackdaw undoubtedly has a bad name, but unless exceedingly numerous, the good it does outweighs the harm ; propbably all will agree that it is now too numerous. This is the opinion of our County W.A.E.C., and their pest Officer and his staff are now engaged in trapping operations to reduce their numbers.

Jay and Magpie. Both these handsome birds have increased in Norfolk during the war owing to the absence of gamekeepers. Both are inveterate egg thieves. The Magpie has a very varied diet and it is difficult to assess its economic status.

Dr. Collinge examined 24 stomachs and found wireworms, cockchafer larvæ, weevils and click beetles, dung beetles, turnip

moth larvæ, egg shells of blackbird and thrush, mouse and vole remains. All this benefits agriculture. There were also present the remains of chickens' and pheasants' eggs, acorns and holly berries. I think that there is no doubt that the number of small birds' and game birds' eggs destroyed by the magpie is very large and on this count their numbers should be severely controlled.

JAY. The diet of this bird is even more varied than that of the Magpie. Dr. Collinge examined the stomachs of 18 birds and found cockchafer larvæ, beetle remains, slugs, snail shells, worms, birds' egg shells, remains of young birds and of mice, also wheat, oats, nuts, acorns, beechnuts and other matters. He concluded his observations by regarding the jay as an almost neutral factor, but it is to horticulture that this bird is a real menace. It is well known that it eats large quantities of peas, beans and fruits of all kinds, and destroys by pecking even larger quantities. These depredations, coupled with its egg stealing habits, places it I think in the ranks of our foes and its numbers should be strictly controlled.

LAPWING. Undoubtedly this bird is the farmer's best friend and it is a matter of the gravest concern, that its numbers are rapidly decreasing in this country owing to the vast numbers of its eggs which are yearly collected and eaten in spite of protection by law. Its chief food consists of wireworms, leatherjackets, slugs, surface larvæ, snails and beetles.

Dr. Collinge examined the crops and stomach contents of 69 specimens and found that the total food consumed during the year was :—

Animal Food 89.0% ..	60.0%	injurious insects, wireworms, leatherjackets, and beetle larvæ
	4.0%	neutral insects
	10,0%	slugs and snails
	10.0%	worms
	5.0%	miscellaneous
	89.0%	
Vegetable Food 11.0%	6.0%	weeds, seeds
	5.0%	miscellaneous
	11.0%	

Thus 70% of the food eaten consists of some of the worst pests with which a farmer has to contend, since they are underground feeders on the roots of his crops.

In addition the peewit is of great benefit to the sheep farmer since it eats the variety of snail which harbours the immature form of the liver-fluke, which causes liver rot in sheep. The benefits conferred by the peewit cannot be over estimated. It is, I believe, the most beneficial bird a farmer can have, no more serious charge can be brought against it than that it eats a few earth worms ; everything possible should be done to stop the sale of eggs and slaughter of peewits before its numbers are further reduced.

Gulls. This is too large a family for me to deal with, but one of its members spends more of its time inland than on the foreshores of our island. This is the black-headed gull, with habits similar in some respects to the plover and inhabiting our marshes, meres and inland waters. It also follows the plough and much more closely than rooks and starlings. It has been observed hawking for moths and winged ants in the evening like a nightjar, and filling itself on daddy-long-legs emerging from shucks in the turf. Newstead records them casting pellets looking like bundles of tightly packed dead grass, and on soaking one of these pellets it was found to contain the remains of 400 crane flies and 1,600 of their eggs evidently taken in the body of the fly. It has also been observed feeding on caterpillars under trees. Much research work has been done to establish on what this gull feeds and contrary to general belief fish food forms a very small part and then only when the gulls were taken in the neighbourhood of fish hatcheries. Instances are recorded of it taking small food fishes, but owing to its inability to get under water, fish 5 inches or more below water cannot be captured.

Dr. Collinge examined 644 specimens throughout a year and found :—

143 Stomachs contained fish remains
317 stomachs contained injurious insects
208 stomachs contained neither food fishes nor insects
267 stomachs contained no marine organisms of any kind whatever.

Of the total food consumed in a year :—

Animal 89.05%	..	3.73% food fishes
		0.05% food fishes ova
		1.02% other fishes
		35.86% marine organisms
		8.18% marine mollusca
		0.11% land mollusca
		24.70% injurious insects
		0.19% beneficial insects
		4.35% neutral insects
		0.38% injurious animals
		10.48% miscellaneous neutral matter
		89.05%
Vegetable 10.95% but only 0.37 was cereals		
		100.00%

A summary of this exhaustive enquiry shews that :—

25.08% of the food is beneficial
70.58% of the food is neutral
4.34% of the food is injurious (only if fish are included).

There is therefore no doubt that the black headed gull is a very good friend of the farmer and that the practice of taking its eggs for market is not in the best interest of agriculture.

Woodpigeon. The Woodpigeon is undoubtedly Enemy No. 1 to agriculture. The only redeeming feature for it that I can find is its delightful voice. What more pleasant sound is there than pigeons cooing round your house, or in the woods. If it were only with the resident population that we had to contend, things would not be bad, but their numbers are so augmented in the autumn and winter by vast flocks from the forests of Europe, that they are a pest to the farmer.

They are the most voraceous feeders and will eat corn of all kinds, beans, peas, veitches, berries, (holly and ivy) in particular, turnips, potatoes, acorns, beechmasts, etc., also green leaves in large quantities particularly clover, turnip, kale and kitchen

garden greens. The following individual crop contents have been recorded from time to time in the " Field " :—

No. 1. 26 acorns and nearly 100 ivy berries
2. 33 acorns and 44 bechmasts
3. 75 acorns
4. 87 beans
5. Tegetmeir records 198 beans and 12 small snails
6. Frohawk records, 370 grains and many husks of wheat
7. Ministry of Agriculture, 160 peas and much corn.

Dr. Collinge examined 428 crops and stomachs throughout a year, with the following results :—

96.5% Vegetable Food	16.5%	barley
	12.5%	wheat
	8.0%	oats
	1.5%	rye
	38.5%	all grains
	9.5%	clover
	8.5%	roots and potatoes
	5.5%	beans and peas
	34.5%	fruit, leaves, grass, etc.
	96.5%	
3.5% Animal ..	2.0%	earthworms
	1.5%	slugs, snails and insects

To analyse these percentages :—

62.0%	injurious to agriculture
36.5	neutral
1.5	beneficial
100.0%	

There is therefore no doubt that this bird should be destroyed, but it is no easy matter as it is very wary. At the present time the Edward Grey Institute at Oxford is holding an enquiry into the status of the woodpigeon at request of the Ministry of Agriculture.

It will be interesting to see, whether immigrants, instead of returning to Europe in the spring, decide to occupy the fir plantations recently raised by the Forestry Commission in England, and feed on the surrounding agricultural crops the year round. If this should happen there is no doubt they will have no difficulty in retaining their position as Enemy No. 1 to agriculture.

GAME BIRDS.

Pheasant and Partridge.

No birds are more closely connected with agriculture than these, and apart from their value as game, they are very good friends of the farmer. At times they are accused, particularly by correspondents in the press, of doing serious damage to farm crops, but in reality the damage (unless pheasants are being reared in large numbers in a small area) is very slight, and it has been proved over and over again, when investigated, to have been caused by woodpigeons or rooks.

These game birds in their natural wild state have a very varied diet, and the pheasant appears to eat a greater variety of food than any other bird. The following have been found in pheasants' crops :—acorns, beechmasts, berries and wild fruits of all kinds, leaves of many plants and grasses, also the bulbs of celandine and buttercups, seeds of many kinds of weeds, slugs and snails, wireworms in very large quantities, leather-jackets, craneflies and grubs of all kinds. Corn, yes a little, but not nearly as much as might be expected.

They will pick up uncovered corn at seeding time and corn left lying on the stubbles after harvest and around threshed stacks, but the quantity of corn feed in their mixed diet, as will be seen from the percentage table later, is comparatively small, and is consumed in the winter : it consists of gleanings from the stubbles.

Dr. Collinge examined the crop contents of 296 birds collected from all parts of the British Isles over a period of six years, and found that the total food consumed throughout a year consisted of :—

Animal Food 37.4% ..	23.4% injurious insects
	2.8% slugs
	8.7 earthworms
	1.5 neutral insects
	1.0% beneficial insects
	37.4%
Vegetable Food 62.6%	41.7% leaves, fruits, seeds of weeds
	2.4% grain
	2.4% roots and stems of crowfoot and celandine
	16.1% miscellaneous matter, mostly grass and leaves
	62.6%

From this record there is no doubt that the pheasant is a most helpful bird to agriculture, the good it does far exceeding the damage ; the numbers of wireworms alone consumed are enormous, and would compensate for all damage done. Yarrell recorded over 1,000 wireworms in the crop of a single bird, and Sir Henry Upcher states that he has counted 163 wireworms in a hen pheasant's crop and that numbers up to 100 are of common occurence.

The time when pheasants can do damage is when hand-reared birds in large numbers have access to growing corn. By frequent flights in or out, and by trampling down the growing straw, they then consume the corn in the ears, but wild pheasants in their natural state pull very little corn down to get at the ears, whereas rooks once they have got a landing stage at the side or even in the middle of a field, rapidly extend it by pulling every straw down and consume the corn in the ear.

Partridge. One of the farmer's best friends, and seldom even accused of doing damage to his crops. Its diet is nearly as varied as that of the pheasant, and without doubt the number of injurious insects eaten, more than compensates for any damage it may do.

Dr. Collinge examined 132 specimens, and found in the food consumed :—

40.5% Animal	..	23.0% injurious insects
		3.0% beneficial insects
		4.0% neutral insects
		6.5% earthworms
		4.0% slugs
		40.5%
59.5% Vegetable	..	53.5% leaves, fruits and weed seeds
		33.5% grain
		2.5% miscellaneous
		59.5%

IV

THE COLORADO BEETLE.

(*Leptinotarsa Decemlineata*).

BY MR. W. H. BACK.

The following record of the appearance of this Beetle in England is taken from "Agriculture," the official publication of the Ministry of Agriculture and Fisheries.

THIS beetle is a foreign potato pest. Formerly it was restricted to the semi-desert region of Western U.S.A. and it has now firmly established itself in North America and many European countries. Its chief characteristics are the longitudinal stripes of black and yellow i.e., running from front to tail and not across its body.

The larvæ are bright pink or red with black spots in rows on their sides and feed on the leaves of potatoes and not the tubers. The beetles spend the winter in the ground, and in early summer emerge and fly in search of a potato crop, and the females lay their eggs in clusters on the leaves, generally on the undersides. In a few days the eggs hatch and the larvæ feed voracously on the potato leaves for 3—4 weeks : when they are full grown they descend into the soil and pupate. In 10—15 days they emerge as fully developed beetles, and themselves feed on the potato leaves, and if the weather is warm they begin egg-laying and produce a second generation before Autumn, when they burrow a foot down in the soil for protection against the winter weather. When there are many grubs, the potato haulm is completely stripped of green, and no tubers are formed.

The Beetle has made rapid increase in Europe of late years and is now a potential danger to Great Britain. The first recorded appearance of this beetle in England was at Tilbury, Essex in 1901, and caused great anxiety amongst potato growers in Southern England. The Ministry of Agriculture knowing to what serious proportions this pest had grown in Europe, appointed inspectors to watch for any further appearance and made all necessary arrangements for measures

to be taken to eradicate it, should it be found elsewhere. It failed to make any further detected appearance until 30 years later. In 1933 the second appearance of this beetle was recorded in the same district of Tilbury. This immediately set in operation the elaborate plans prepared by the Ministry of Agriculture to do everything possible to prevent this menace to the potato crop from establishing itself in this Country.

Control measures taken included :—

1. Inspection of potato crops in coastal areas.

2. Publicity through the Press, posters and leaflets to all potato growers to watch for any sign of the pest.

3. A reserve of spraying machines and insecticides kept for immediate use.

4. In event of an invasion by the beetle, hand picking of all larvæ pupæ, beetles and eggs.

5. Inspection of the soil where larvæ were found, and spraying of other potatoes in the field and district.

6. Search of potato crops within a 5 mile radius.

In 1934 and 1935 a wide inspection of the crops of potatoes in the Tilbury area was made, and yielded negative results so that it was hoped that the measures taken had been successful in eradicating this beetle in the district. In 1935 however, one immature larvæ of this beetle was discovered on a lighter in the Surrey Commercial Dock. The spread of this beetle in Europe and particularly to the North coast of France and the Channel coast involved greater risk of the pest reaching this Country by direct flight or by boat and this necessitated increased vigilance.

In April, 1936, two dead beetles were found on an allotment adjacent to Tilbury : a search was immediately made, and revealed further specimens. A wider search was then started by the Ministry including the South Coast and the greater part of Essex and Kent. Dead beetles were found along the Essex, Kent and Sussex coasts and one live beetle was found again in the Tilbury area.

During 1936 three living beetles were discovered on ships in ports, one each on two vessels from Canada, and one on a vessel from France, and a single beetle was found on a cart track in Suffolk.

In 1937, in spite of careful watch only a few dead beetles were found in South Essex and North Kent. The discoveries made in 1936 and 1937 suggested a migration from the Continent in the Autumn of 1935 but the migrants had fortunately failed to survive the winter. In the summer of 1938 a special entomoligacal investigation of the Tilbury area was made but no sign of the beetle breeding was discovered.

During 1938, three beetles were found at Southampton in boats from St. Marlo, and two dead beetles at high water mark in the Thames Estuary.

In 1939, one live beetle was found in Barry Dock near a boat which had arrived from France and another was found at Southampton in packing material from the U.S.A. During 1939 and 1940 a survey was carried out by the Ministry's officials off the South coast without disclosing any sign of the beetle.

In 1940, the war traffic across the Channel in the evacuation from Dunkirk raised fears that the beetle would be brought over here. Careful observation was kept and the only occurrence was reported by a Customs officer at Whitstable, that beetles had been discovered in a vessel from Brittany with a cargo of oysters in sacks. The vessel was anchored at sea, the cargo deposited in the oyster beds, a thorough search made, and 16 beetles were found.

In 1941, the beetle was found in potato crops in six different places, in Dorset, Glamorgan and Devon (4 cases) :—

On 9th July, 35 larvæ were found on two potato plants in Weymouth. On 10th July, 140 larvæ were found on potatoes at Swansea. On 1st August, 279 larvæ and pupæ were found on potatoes at Dawlish. On 18th August, 20 larvæ and 7 pupæ were found in an area of a few square yards in a 30 acre field of potatoes at Bratton Clovelly, Devonshire, being 15 miles from the nearest point on the North Cornwall coast. On 27th August, 66 larvæ and pupæ in a 3½ acre field of potatoes at Broadwoodwidger, 4½ miles from the last locality. On 18th September, live beetles were found in a 5 acre field of potatoes at Clyst St. Lawrence, 8 miles N.E. of Exeter, in two areas, 52 live beetles and 1 larvæ in one, and 17 live beetles and 1 dead in the other.

The 1941 infestations, possibly the result of direct migration, were looked upon so seriously by the Ministry that in addition to the routine measures taken along the South Coast, further steps were taken such as intensification of publicity, inspection of all potato crops in the South West, precautionary spraying of all potatoes within 5 miles of the 1941 infestations, confirming potato growing in 1942 to the fields which carried potatoes the previous year.

In 1942, the beetle was discovered in five places again at Broadwoodwidger : also in three places at and within 5 miles of Witchampton in N.W. Dorset, and at Tinhead in Wiltshire.

In 1943, special observation was kept in the S.W. counties but only one outbreak was discovered in allotments at Seend in Wiltshire when beetles and larvæ were found on six plots.

In 1944, the beetle was not found in any potato crops in this country but beetles were found on vessels and aeroplanes engaged in the military operations across the Channel.

In 1945, during May, beetles were found on a number of Cross Channel boats and port and customs officers as well as ships' officers and crews co-operated to prevent these passengers from landing. During this month and early in June, single beetles were found in gardens near the south coast ports. As there were no potatoes growing in these gardens it must be assumed that they had migrated. On 16th July, an allotment holder in the centre of Faversham, Kent, reported a small outbreak of beetles on allotments there. On July 19th, farm workers reported beetles on an 8 acre field of potatoes 3 miles from Faversham. Careful search of the field disclosed adult beetles pupæ and eggs, but no larvæ. in 3 small areas. On 2nd and 3rd August, more beetles were found by farm workers in fields 2 miles from the last outbreak and on 9th and 14th August, further small outbreaks were discovered in 2 more fields nearby.

These discoveries set in motion immediately the detailed plans of the Ministry of Agriculture whose officers and inspectors assisted by members of H.M. Forces at once started searching potato crops in the area and large scale spraying operations were undertaken. On 28th July, 1 beetle was found near Deal, and on 1st August, 3 beetles were found in a field at

Haine near Ramsgate and 30 to 40 larvæ and pupæ were found on 2nd August in a field at Sompting near Worthing. On 24th August, 1 beetle and 1 grub were found in a 42 acre field of potatoes at Minsterworth near Gloucester. Spraying and soil injector operations were put into action and an inspection of 200 acres of near-by potatoes revealed no further beetles in 1945.

The following outbreaks and appearances have been discovered in 1946, but as yet no official report as to numbers of beetles and larvæ has been published by the Ministry of Agriculture —

June. 1 beetle at Wolverhampton in case of lettuces imported from Holland. July. Larvæ found in potato field at Kemsley, Kent. August 9th. 200 beetles and larvæ found in a potato field at Wallington, near Downham Market. This is the first discovered outbreak in Norfolk. September. 1 beetle found at Croydon airport amongst packages flown over from Nice. During the war, this beetle has much increased in France, and the chances of migratory invasions over here are great, so that it behoves all growers of potatoes to keep watch for this pest. Any suspected beetle or larvæ found on potatoes should be placed in a tin box with a piece of potato leaf and posted immediately to :—Plant Pathology Laboratory, Milton Road, Harpenden, Herts., with name and address of sender and exact location of the finding of the beetle.

V

BRITISH DEER.

By Anthony Buxton.

No group of animals has in the process of evolution made greater strides in appearance than deer and I shall only mention one of the deer of the past—the Irish elk whose remains are found mainly in Irish bogs at a depth of 5 to 10 feet in shell marl below the peat. The body of a man was found in an Irish bog and it was clothed in a garment of rough dark hair—probably an elk's. There must have been some good stalking in Ireland in those days. The remains of red deer have also been found in Irish bogs and they show that the ancient red deer of Ireland were no bigger than the red deer of today. To carry that spread and weight of horn the Irish elk must have had a neck at least as thick and strong as that of a modern elk. I imagine him a beast of open forest, perhaps Scots fir, for as wide a head as his was most unsuitable for movement through close timber—a dark grey long-haired thick-coated brute, but not so front heavy as the elk of to-day and with a body framed not unlike a wapiti or a red deer. The remains of true elk have been found at East Runton and Mundesley. Presumably Norfolk was then an even colder place than now, for elk are at present confined in Europe to Scandinavia and neighbouring northern countries. Reindeer were apparently abundant in these islands in late prehistoric times and seem to have survived in Caithness until late in the 12th century.

So much for the past, at present there are three deer in these islands, fallow, roe, and red deer. Fallow are not quite entitled to the adjective British for they are not indigenous and were imported probably by the Romans. There are two types of fallow in the world, the one which everybody knows with the widely palmated horns and another, confined so far as I am aware to a small strip of country in Asia Minor between the Taurus mountains and the sea—the plains of Cilicia. The fallow deer in the British Isles are of two types, the one so dark in colour that its spots are only visible in strong light, and the much commoner lighter-coloured form. It is said, I do not

know on what foundation, that the dark race came from Northern and light-coloured race from Southern Europe. The purest breed of dark fallow that I know are the inhabitants of Epping Forest. The New Forest also contains some dark fallow, but they are not so uniformly black as Epping deer. With the exception of these two localities, Fallow deer are, or were, (very much were) confined to enclosed parks. To my eyes, fallow lack grace of action and form when compared with many other kinds of deer. They are rather skulking beasts and are apt to seek safety in thick covert rather than in long flight. The action of fallow deer in movement is sometimes mincing and sometimes stilted. They creep about with heads held low in thick covert with an air of indecision, and the leading doe of a herd moves with jerky action, nose well out in front of her as though she was always expecting to step on a mine. On alarm they move in a stiff series of bounds, quite unlike the proud action of red deer or the graceful bounds of a roe. Moreover there is no special charm about their noses, their eyes, their ears, or the horns of the bucks : nor do I admire the way they hold their rather obvious tails. Nevertheless I have had great fun with them in my early days in Epping Forest, particularly during the rutting season which begins about the second week in October and lasts a month. At this season, the call of a buck is a pig-like grunt, amusing rather than awe-inspiring, and the call of the doe is a squeak or bleat that might be made by a toy.

As with all deer at this season the actions of the bucks are entertaining. The master buck is never still, herding the does in a circle, grunting as he moves with head held low and Adam's apple very visible ; making short runs to drive away the inevitable young bucks hanging about on the outskirts of the herd and trying to get in when the master's attention is engaged elsewhere. In a forest such as Epping it is difficult to see an actual fight, but in an open park, it is comparatively easy. One fallow buck will sometimes kill another, but his horns are not nearly such formidable weapons as those of a red deer or even of a roe. Their wide palmation no doubt makes them an excellent holding-off weapon, but they have little in the way of a sharp point with which to drive home a flank attack.

Fallow deer fawns are dropped in June and the bucks shed their horns in April and grow a new pair by the end of July. The horns of fallow bucks "in velvet," i.e., still covered with the soft but tough skin that protects the growing horns, are quite becoming, whereas to my eyes at least the velvet spoils the look of the head of a red deer or a roe. The height of a fallow buck at the shoulder is about 36 inches. Somebody wanted some black fallow, and an attempt was made to catch specimens with nets in Epping Forest. It proved extraordinarily difficult, but I remember one exciting occasion. After long and careful manœuvres, we persuaded a mixed herd of about 15 to enter a net set in the shape of a bottle. I was mounted and as the last part of the herd entered the enclosure, I cantered up to close the bottle. As I jumped off my horse to get hold of the net, one old buck put his head down and charged straight at me and slipped out, followed by two or three more bucks before we could get the net across, but the rest of the herd were there and we thought we should catch the lot. A doe charged the net and got hopelessly caught, but her struggles caused the net to bulge and sag and either under or over all but one young buck escaped. He made a gallant sideways jump and caught his nose in the top of the net and turned a complete somersault still entangled by his horns. He was, together with our few other captures quite unhurt.

Roe are much the smallest of our deer, standing 26 inches at the shoulder and in appearance extremely dainty, both in movement and at rest. They are very widely distributed in these islands and apparently were so in the past. I believe that there is no county in Scotland in which they do not exist and in most of the Highlands they are common. In England their main home is Dorsetshire from which they have spread and are I believe still spreading in all directions. They are common in parts of Northumberland, Westmoreland and Cumberland, and there are some in Breckland as well as in other parts of the country. They are however rather particular about the type of country they inhabit as I know from experience in Epping Forest. My father re-introduced them there from Dorsetshire, but it did not really suit them and they confined themselves to certain small areas of the Forest and some of the coverts outside its borders. Roe are very particular in their choice

of ground and I have never been able to discover exactly what they consider to be essential—possibly it is some fungus.

They are strictly a forest animal and are seldom found outside a wood except when bothered by flies. In Scotland for instance, roe move up in August during hot weather, when flies bother them, and lie out on the moors in long heather or bracken, but when the fly season is over they come down again into the woods. Unlike most deer, roe are not gregarious, and are generally found singly or in pairs. The rut is in the last week of July and the first week of August, i.e., more than two months earlier than in the case of fallow deer and eight weeks earlier than red deer and yet fawns are dropped in June. The period of gestation is therefore over ten months and at least two months longer than that of their much larger relatives. The embryo in fact hardly begins to develop until after Christmas. I have never heard any satisfactory explanation of this strange phenomenon. Twins are common and that is not the case with red or fallow deer. Roe have another peculiarity. Most deer, possibly all except the freak Père Davide's deer of China, shed their horns in the spring and grow them by the end of the summer. Roe shed theirs in December and grow them by April, in fact undertake this trying ordeal just at the time when food would seem to be shortest. Perhaps this is not in fact the case for roe are often very fat in winter.

The alarm call of a roe, whether buck or doe, is a sharp deep bark, loud and very startling. It makes one jump and is no doubt intended to do so; it makes other animals jump too. In the rutting season the doe squeaks and instruments are made which imitate this sound and draw a buck, who generally arrives at full gallop. The colour of roe differs markedly in summer and winter. The summer colour is rich red brown all over except on the face, which is grey with a very striking black and white pattern on the muzzle. It is the black and white muzzle and highly cocked ears which gives a roe's face a look of impertinence. In winter, the coat is dark brown with no red about it and the animal has a snowy white rump which gives an attractive finish to its bounding departure. There is no white rump on the summer coat, but a yellow one in autumn.

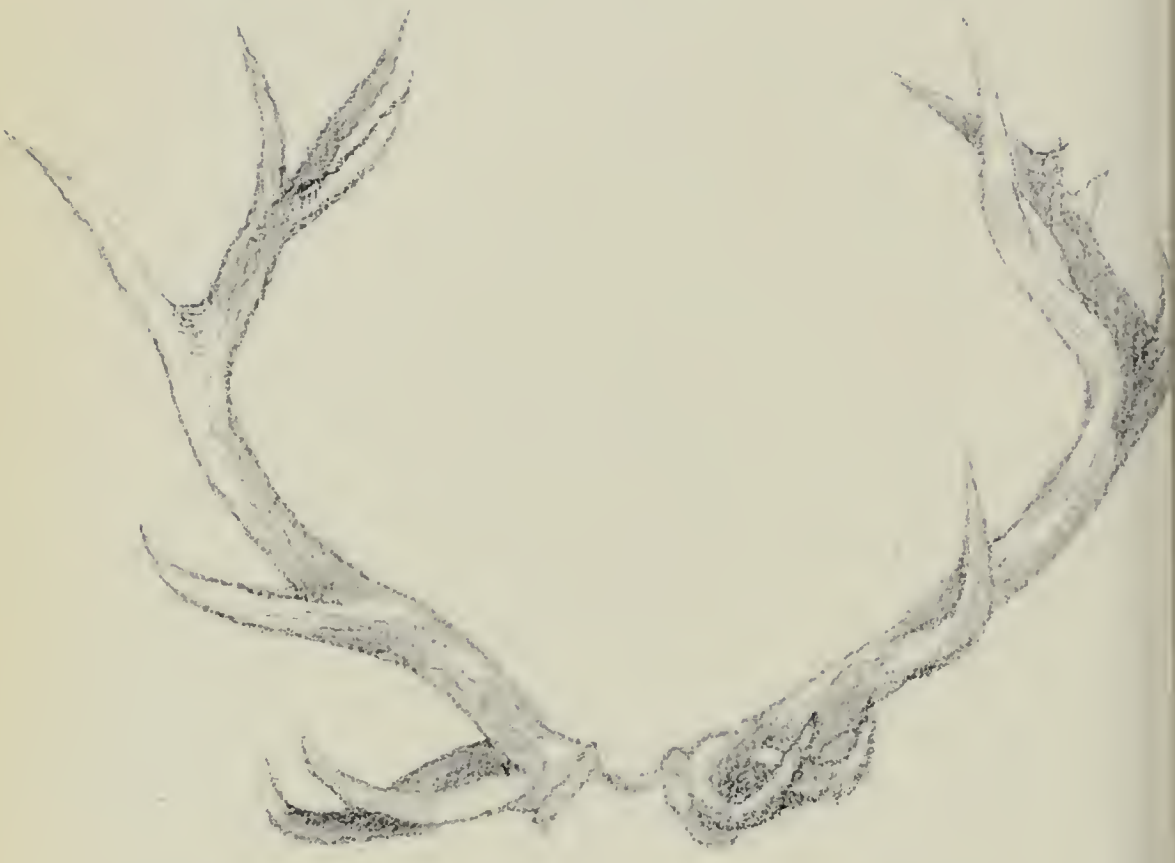
Caucasian Roebuck.

Roe fawns are heavily spotted delightful little creatures and are adepts at lying still. Their mothers, at sign of danger, press them down on to the ground with their chins to make them squat. I remember seeing a roe doe actually do this to her fawn only about 100 yards from me in Epping Forest. I went straight to the spot which contained no really thick covert but entirely failed to find the fawn, although its mother kept wandering round me squeaking all the time.

One of the most perfect drawings of a wild animal that I know is of a roe fawn standing up for the first time and obviously wondering if its legs will support it. It is by Eherhardt, but whether he is Austrian or German I do not know. Large numbers of beautiful reproductions of this drawing have recently been sold in this country. Unlike most deer, roe have practically no tail. The tail is minute and entirely hidden by the body fur. Some artists make the mistake of giving them a visible tail, in fact very few people have ever learnt to draw a roe, J. G. Millais being a brilliant exception for it was his best animal. Roe are dainty in all their movements, in the way that they pick at their food, in the way that they place their feet, daintiest of all perhaps in those amazing bounds with which they depart at the sign of danger after giving out a series of barks. There is no sign of effort in their bounds, they follow each other in easy succession like the bounces of an india rubber ball. The bounds are not kept up for long, and the animal soon relaxes into an easy smooth canter or gallop. Roe are wonderful jumpers. I once disturbed a young buck from heather outside a wood, bounded by a high stone wall, topped with three strands of wire. The buck flew the wall, twisted in the air, shot through the top gap but one in the wire and landed on his feet. Roe are unpopular amongst young timber, not only because of their habit of nipping off shoots but because the bucks delight in rubbing their horns against, and even demolishing, young trees. Roe are much the same size all over Europe but the roe of the Caucasus grows far bigger horns than elsewhere, probably owing to very rich food. In Manchuria, there is a race of giant roe not in fact very big, but giant compared to our animal. Roe look as if they would make nice pets, but they do not thrive in captivity and the bucks are extremely dangerous. Though their horns are small the points are very sharp and they are apt to charge fast and low.

And so to the red deer—to my eye the best looking of all deer, his cousin the wapiti of America and the Thien Shan not excepted. There is a tendency in red deer to increase in size as they go east at least up to a certain point. The biggest red deer in the world are found in the Eastern Carpathians, in the Caucasus, in Asia Minor and in Northern Persia. Whereas our deer are about 4 ft. at the shoulder these animals run to 4 ft. 6 ins. In Persia the increase in size stops and the closely allied form of the Himalayas, the barasingh does not quite come up to his cousins in Eastern Europe and Western Asia. Our island red deer are small compared to such beasts indeed less than half the size, averaging about 15 stone as against 30 stone and up to 40 stone in Eastern Europe. That was not the case when the North Sea was forest and the Norwich Museum can show a head dug up at Rockland-All-Saints near Wymondham in 1850, that would make anyone's mouth water and must have been carried by a very big stag. Mr. E. A. Ellis found a large horn of a red stag at Scolt Head: he saw it by moonlight glistening in the sand.

At the present day in these islands apart of course from parks, there are plenty of deer in the higher parts of Scotland, on Exmoor, a certain number in the Lake District and in the New Forest. The last red deer was killed in Epping Forest about a hundred years ago. In Ireland there are still wild red deer near Killarney. The red deer was at one time responsible for more legislation than anything else in these islands. Every sort of restriction was put on everybody and everything in order to protect the deer for the King's pleasure and sport. If a freeman made a deer so much as pant, he lost his liberty and a serf lost his life. Dogs lost their toes if they lived in the vicinity of a Royal forest. Deer in fact are responsible for some of our most undemocratic laws. The nomenclature of those old days has been handed down to us and it is still a puzzle to those unfamiliar with deer. We still talk (or ought to talk) of a stag hind and calf of red deer, and of a buck doe and fawn of fallow and roe and there are many more complications than these, some of them introduced by America into which I need not enter. The red deer is a forest animal and the conditions in which he lives in Scotland on high bare tops are not natural to him. He has been pushed there and pampered when he has got there,



Stag's Head dug up at Rockland-All-Saints, near Wymondham in 1850.

Caucasian Red Stag.

but those conditions do not lead to big deer or big heads. They do tend however to a peculiar type of head, wide and with few points. A "switch," the term for a pair of horns with no points, except the brow antlers, is a type of head common in Scotland but nowhere else. Indeed anywhere in these islands, a red stag's head with more than twelve points is something of a rarity, whereas in Europe, especially in Eastern Europe, eighteen pointers and over (or enders as they call them in Germany) are not uncommon. Being a forest animal a red deer relies for safety on his nose and ears far more than on his eyes. His eyes, though delightful to look at, are not so good as a roe's, and I doubt if they are better than a man's. His nose is the best in Europe, and his ears lag little behind ; indeed they give an impression of beauty coupled with efficiency. So does a red deer's action. The easy swing of the trot, the sharp angle of the hock left behind him so long that one feels he has forgotten it, until it is recovered at the last moment, and above all the high proud carriage of the head stamps a red deer. No wonder that they called him a Royal beast.

Our red deer are much redder than their cousins of Eastern Europe, indeed the latter are hardly red at all, they are the grey colour of our deer's faces, but the peculiar shape of the rump mark is the same in all red deer whatever their habitat from Southern Spain to Caithness or from Ireland to the Himalayas. The coats of our deer are a light red brown in summer turning darker with the autumn and fading to an ugly grey in spring. It is not fair to look at red deer in the early Spring, they have lost their glory. September and early October is the time to see them at their best. Then the stags that have shed their horns in April, grown them by the end of July and cleaned the velvet off in August, are in the height of condition. Their necks have swelled, their ruffs have grown, they have darkened their horns by rubbing them in the peat and on the trees and the white points gleam against the dark. That is the time to look at red deer, and for another reason ; the end of September and October is the rutting season and the manœuvres of a stag to herd his hinds and hold them against his rivals are intensely interesting and amusing. Moreover a stag's roar, only made during the rutting season, is an awe-inspiring sound and his actions as he thrusts

out his neck and lifts his nose to roar have a fine look of challenge. I often doubt, however, whether a red stag is quite so keen for a fight as he pretends. In my opinion he is happiest when he can see or wind his rival safe on the other side of a valley and can tell him with impunity exactly what he thinks of him. Hinds bark when alarmed but it is really a loud sudden cough rather than a bark, not so dog-like as a roe's, but equally startling. It is a hard life for a stag at this season : hinds are not always amenable, are apt to stray in more senses than one and young stags apart from old ones are never far off round the corner. I remember an amusing incident with a big old switch that I was trying to stalk with a camera. He was in a vile temper, driving his hinds about in all directions and never giving them any peace, and one hind in particular was always dodging round a knoll out of sight. I thought something was going to happen and it did. There was the inevitable young gentleman waiting round the corner and while the master stag was for a moment out of sight she was off and away with him and the old stag never saw her again.

Stags at such seasons occasionally go to sleep. I had spent the morning trying to get within camera-shot of a very fine stag, who was roaring his head off. He was constantly on the move driving his hinds before him and we thought that he would never settle, but at last his hinds lay down close to a birch wood and he dropped into a peat hag 100 yards off them, wallowed, and then went to sleep. We crawled into position at the edge of the birch wood, but were spotted by the hinds who bolted away from the stag. Suddenly he woke up to find they were gone. While we were still setting up the cameras, he saw some movement and thought it was his wives : with head erect he advanced upon us, recognised his mistake, turned, lowered his nose and hunted the line of the hinds like a hound to re-find them a mile away.

The movements of a stag at this season of love and war are generally supposed to be governed by the herd. That is not true. If a really close watch be kept, it will be seen that the movements of the stag are governed by the movements of one hind in the herd, the favourite of the moment. He sticks to her like a leech, and the rest of them do not really count for him

except that he wants to keep them round him. He does not always succeed. I remember an occasion, when a herd had just heard or seen something of our movements and were highly suspicious. Half of them with the stag bolted, while the rest led by a wise old lady, who had no doubt had enough of the stag, watched them go and then moved off in exactly the opposite direction. Except during the rut, old stags and old fallow bucks shun female society and keep to themselves. A battle between two stags may be a serious affair and may prove fatal to one of them. The rivals advance upon each other sideways with their heads turned in towards each other. Their object is to deliver a thrust from the side. I once saw a good fight in a park. A stag with a large herd of hinds was obviously much run and tired and another stag of about the same size challenged him. There was a lot of manœuvring and pushing with horns locked and it was obvious that the freshest stag was getting the best of it. The other just managed to disengage and jump clear from a savage thrust at his flank. He fled and his victor took over the hinds and drove them off to another part of the park. I heard recently of the skeletons of two stags with horns interlocked that had been drowned in a Scottish loch. The fact that a 'hummel' (hornless stag) often succeeds in holding a number of hinds, makes one wonder how far horns are just ornaments, rather than effective weapons. During the war, the deer in Windsor Park, have owing to farming operations been confined to a comparatively small area and I went to look at them then with the Rev. Humphrey Barclay. A good stag accompanied by hinds was roaring at intervals, while another stag lay by himself about 300 yards away. We went towards the latter who lay still looking at us. My companion said he would move him, threw his stick towards him and told his retriever to fetch it. The stag leapt up looking extremely unpleasant with every hair standing out on his ruff. I suggested retreat, which we carried out with great caution, while the stag stared haughtily at us. Stags are not safe things in a park in October.

Hinds drop their calves in June and the little spotted creatures lie very low and still for the first days of their existence and are visited cautiously by their mothers. They retain their spotted coats until late July or August. The actions

of red deer on seeing or smelling something they dislike are very different. In response to their nose the action is instantaneous and certain, in response to their eyes it is halting, questioning and slow. It takes a long time for a red deer to trust it's eyes, not a second to trust it's nose and very few to trust it's ears. I have never tried to make accurate tests of the distance at which a red deer can wind a human being, and it no doubt depends on the weather and the lie of the ground, but I should think that under suitable conditions they could do so at the distance of a mile.

Deer are very particular about wind in settling where they shall lie up for the day. They hate draughts and love shelter, but in very hot weather, particularly in the fly season, they seek a breeze and are constantly shifting their position to get away from the pests. In October, they shun bracken in Scotland because it is infested with deer flies, horrible flat insects which look very much like enlarged grouse flies. They and particularly hinds with calves are frightened of eagles and bunch when they see one near them. Eagles certainly account for a certain number of calves and I have heard of one instance of an eagle driving a full grown hind to it's death over a cliff. There is one thing common to all the deer that I know. Owing to their long thin legs they are not happy (as are goats, chamois and some other animals with sturdy limbs) on really steep ground and are particular in choosing easy passes up or down hill. This is particularly true of the largest deer in the world, which exists in the Eastern as well as the Western hemisphere. In Europe, we call him an elk and in America they call him a moose, but he is to all intents and purposes the same beast. Supporting a heavy body on remarkably long legs he is very careful in avoiding steep ground and prefers to trot over obstacles rather than to jump them, and so avoid a jar.

VI

WILD BIRD PROTECTION IN NORFOLK IN 1946

Report of the Council

The Council is pleased to present to members its report on the bird life of Norfolk for 1946.

The Trust has grown so rapidly in the last few years that it now owns and maintains as nature reserves some 2,300 acres of marshes, heathland, woodland and water, on the coast, in Breckland and in the Broads district.

This expansion has been made possible by the generosity of its supporters from all parts of the country, and of some from overseas, and the Council is most grateful for their interest and financial help.

Such growth has greatly increased the work of maintenance and administration and, in order to simplify, to some extent, future Balance Sheets, it is proposed to publish no separate accounts for the Bird Protection Fund. The money will however be devoted to the same purposes as in the past, and the list of subscribers will appear at the end of the Bird Protection Report. This will be circulated as usual at the beginning of each year to all contributors. Annual subscribers of ten shillings or more will, under the Articles of the Trust, become ordinary Members of it. Those who make an annual contribution of less than this amount will be listed as subscribers ; but it is hoped that some of the latter will consider increasing their subscription in order to become members of the Trust.

The year 1946 has not brought as many rare migrants to Norfolk as in some years but the numbers of its special breeding species such as the bearded tits at Hickling, the harriers, the Norfolk plovers on the brecks and the Sandwich terns at Scolt Head, have been well maintained. An interesting addition to the County's list of breeding species is the kittiwake gull, a pair of which nested on the beach at Scolt Head among the Sandwich terns. We are indebted to Mr. John Stacey for the photograph which puts this strange occurrence on record : also to Mr. Walter Higham for his beautiful picture of the wood-sandpiper taken at Whiteslea. Both of these photographs are unique and much enhance the value of this Report.

SCOLT HEAD ISLAND

The following records have been extracted from Chestney's diary for the year.

The winter was on the whole a mild one with hardly any snow, and as is common in an open season there were no unusual migrants reported on the Island or in the harbour.

Snow-buntings arrived in December 1945 and a large party of these, some of them beautiful little birds showing much white, were seen from time to time during the early part of the year. They gradually diminished in number until only four birds remained on April 11th.

A party of nine shore-larks were noted on New Year's day. These had increased to nineteen on February 27th : the last record being on March 18th when four birds were seen.

Hen-harriers frequented the island from January until April 4th. On one occasion two of these birds appeared to be chasing away a third one from their hunting ground. They shadow the large flocks of linnets which feed on the marshes, and undoubtedly take toll of these and of the snow-buntings.

Merlins also feed on these small birds of the island. On January 14th one was seen by Chestney to kill a snow-bunting in the air, and on February 26th one of a large flock of linnets was taken.

Short-eared owls were frequently flushed from the marram and on February 21st there were nine at the East end of the island.

Brent geese were in the harbour in large numbers throughout January, February and March. On March 20th there was an influx of them, possibly a party from further south joining up in preparation for the return to their northern breeding station. Two of these birds remained until May 13th but such a late stay is usually due to injury.

A party of twenty-five swans was seen out at sea flying eastwards on Jan. 22nd but they were too far off for identification. Divers were identified on the sea from time to time, a great northern and several black-throated being seen on January 22nd.

There were four mergansers in the creek on January 18th. These birds seem to have become less frequent visitors of recent years.

Nine velvet-scoters on the sea on January 31st were near enough for their white wing-bars to be seen without the aid of field-glasses.

February began with exceptionally fine mild weather and on the 15th of the month both ringed plovers and sheld-ducks foreshadowed the nesting season by courting and looking for for nesting sites.

On Feb. 20th two long-tailed ducks, both male birds, were in the harbour in company with goldeneyes, tufted, wigeon and Brent geese. A second record for long-tails was on March 11th when there were two females and one male in Norton creek.

A party of nine scaup were noted at the Overy end of the harbour on February 28th. There were also 100 sheld-duck in the creek on the same day.

The record for March opens with a note of four glaucous gulls on the beach on the first day of the month.

This month was unusually warm and by the end of it the waders which had been gradually collecting included numbers of bar-tailed godwits, turnstones, grey plover, knot, curlew and sanderlings.

On March 31st ringed plovers were making scrapes all along the beaches and oyster-catchers were preparing their nests.

On April 3rd a number of grey geese passed by in a westerly direction. Very few had been seen during the winter and they do not appear to have used the marshes at Holkham at all. This is probably due to the firing which has taken place during the past few years.

As usual the first wheatears to arrive on the North Norfolk coast were a fortnight later than those seen on the brecks in the S.W. of the County. On April 10th one wheatear and four swallows were seen on the island. On the same day larks were flying in from the sea. Common redstarts and pied-flycatchers passed through on the 16th. The first swift was noted on May 12th. Greenshanks were heard on May 11th. Two black terns were over the Cockle Bight on May 2nd and this species was again noted on June 13th and 18th.

first egg was mistaken for a black-headed gull's and was picked up. (Black-heads are not permitted to breed on the ternery because of the damage they do to the tern chicks in the neighbourhood of their own young.) The kittiwakes' nest began as a low structure of seaweed with a few twigs, but each time the birds came to it they added more seaweed until it was about nine inches high at the edges. The second egg was brooded until July 11th (27 days) before the birds left it and it was found to be infertile.

An interesting fact should be recorded here that on June 30th a flock of about 100 kittiwakes, consisting of eight adults and the rest birds in first summer plumage, were resting on the beach at the west end of the island not far from the nest. It is most unusual for this species to be seen in such numbers on the Norfolk coast at any time, and particularly so in mid-summer.

The following list gives an estimate of the number of nests of the breeding species on the island :—

Breeding Species.

Sandwich tern	..	1,900 nests (in seven colonies) most of which hatched and flew.
Arctic tern . .	..	Three nests and possibly more.
Common tern	..	1,400 nests. A large number of chicks died in the first 48 hours but as the birds went on nesting throughout the summer a large number hatched successfully and flew.
Little tern ..	..	109 nests. Spread over a large area extending from the ternery as far down the beach as the Hut dunes. None was washed out by high tides this year as the beach is considerably higher.
Roseate tern..	..	One nest. The two eggs hatched and the young were seen on the wing with the parent birds.
Kittiwake gull	..	A pair nested on the ground among the sandwich terns on the beach at the end of the dune area. The eggs proved infertile.

Black-headed gull ..	A large colony returned to the marshes and made nests on the mounds of mud blown up by the shells.
Ringed plover ..	41 nests found. A good many more probable.
Redshank	16 nests found.
Oyster-Catcher ..	34 nests found in the Hut area and to the W. of it.
Sheld-duck ..	Rather fewer than usual.
Swallow	None nested on the Hut this year.

Two marsh harriers seen flying in from the sea on May 16th were mobbed by terns and oyster-catchers as they passed over the island towards the mainland. Marsh harriers were seen frequently throughout the summer and it seems probable that a pair bred in the coastal area between Holkham and Brancaster. They were often over the golf course but each time they ventured over Scolt Head they were attacked so viciously by the terns that they beat a hasty retreat.

Short-eared owls did not nest on the island but three pairs bred to the east of it, in the neighbourhood of Burnham Overy. Chestney found one of these nests which then contained two young and three eggs, and later a second nest was found by Mr. Foster.

In July there were a number of gannets, both adult and young birds, flying eastward on the 17th, 25th and 30th. There were plenty of mackerel about at the time and these birds were apparently feeding on them.

The first Arctic skuas of the season were seen chasing terns on August 5th. Others, and also a few great skuas were noted at intervals during August and September. The fresh corpse of a juvenile long-tailed skua was picked up in the dunes on October 9th by the Hon. Mrs. L. Russell.

On September 4th a party of siskins were resting on the wire of the Overy sea-wall. They were apparently tired and very tame.

A big movement of small birds was observed between September 9th and 11th. Redstarts, spotted and pied flycatchers, swallows and wheatears were passing through. Also large numbers of rooks, green plovers and skylarks.

On September 29th there was another big migration which included song-thrushes, redwings and a magpie. The latter was seen to come in from the sea, flop down into the marrams and rest there for a long time before it moved on.

On October 3rd bramblings were found resting in the bushes near the Hut, and a ring-ouzel, in company with blackbirds and thrushes, in the suæda bushes of Butchers Beach.

The first shore-larks and snow-buntings of the autumn were reported on October 11th by the Hon. Mrs. L. Russell's party which was staying at the Hut. On the 16th Chestney saw five snow-buntings and four shore-larks and by the 20th the latter had increased to forty.

The last notable movement of small birds recorded was on October 21st after a foggy night. Robins, common redstarts, fieldfares, blackbirds, lapwings and skylarks were seen coming in from the sea most of the day. The next day, Oct. 22nd short-eared owls, a woodcock and a hen harrier were noted.

In mid-November a male long-tailed duck was in Norton Creek for several days. At the same time there was a large number of very badly oiled birds, including divers and scoters, in the harbour. Those which were picked up were covered with thick crude oil.

BLAKENEY POINT

Ted Eales has completed his first year as keeper on the Point since his return from war-time service as a Petty Officer in the Royal Navy.

One of his most important jobs is to keep down the rabbits, and the vermin. His diary, from which these notes are taken, shows that he killed ninety-seven rats in the season as well as several stoats. Two-thirds of the rats were taken during the winter when they are known to leave the uplands in order to feed on the mussels etc., on the shore. This migration is obvious on the coast roads where numbers are run over by cars at night.

There was little bird life of interest on the Point during the winter months except for a few shore-larks and snow-buntings. The harbour was used by numbers of Brent geese with many wigeon, goldeneye, some pintails, common and velvet scoters,

and occasional great northern divers. There were nine pintails on the Beachway marsh on January 29th. This species is rarely seen on the marshes of the Scolt Head area which would appear to be similar to those between the Point and the mainland.

A movement of blackbirds appears to have taken place on March 1st when the suæda bushes were full of them. They flew in from the N.E. and stayed for two or three days before moving on. Most of them were dark-billed birds of the first year.

Ringed plovers' eggs were first noted on April 12th, the same day as on Scolt Head.

Sandwich terns began to arrive on April 13th but they never really settled down, and although some eggs were laid on the Far Point at the beginning of May these were pecked, and the birds left on May 12th. A later colony were worried by black-headed gulls and they also left on May 29th.

Roseate terns were seen on June 7th but did not stay to nest. It is probable that these were the pair that settled down on Scolt Head.

The following nests were marked or estimated :—

Common tern (estimated)	1400
Sandwich tern	2
Little tern	89
Oyster-catcher	31
Ringed plover	136
Sheld-duck (estimated)	45
Redshank	11
French partridge	1

Black terns were numerous and frequent visitors to Norfolk during the spring and summer of this year. On May 11th forty were resting on the sands of the Far Point.

A late " Hoody " was seen feeding on the remains of a ringed plover on the beach on May 19th.

There were some exceptionally heavy storms during the summer. On July 2nd large hailstones did much damage killing

numbers of chicks, and again on the 28th young terns were drowned by the downpour of rain.

An early record for purple sandpipers was August 2nd when three arrived and remained until the 12th.

A black redstart was seen on the beachway on August 14th.

A movement of small birds was obvious on September 9th when the bushes were alive with willow wrens, whitethroats, garden warblers and other travellers.

Winter visitors began to arrive on October 2nd when twelve Brent geese alighted in the harbour. On October 8th redwings, starlings, green plovers and grey crows were passing through all day ; snow-buntings arrived on the 12th ; a woodcock was noted on the 17th and bramblings with a great number of chaffinches on November 2nd.

CLEY AND SALTHOUSE

The drainage work begun in the autumn was completed in January. The cleaning out of the dykes carrying water from the Freshwater Drain will help to wash out the salt with which the marsh has become impregnated during the forced neglect of the war years, and the grazing should be much improved. It is hoped that with more cattle and horses on the marsh, and more shallow fresh-water pools, the right conditions will be established for attracting duck and waders. Bishop has already constructed one such new pool near the East Bank, which proved highly attractive to various waders, including ruffs and reeves, during the autumn migration.

The following notes have been extracted from his diary with one or two additions from visiting ornithologists.

Breeding Species :—Eight bitterns were flushed during a walk round the marsh on February 14th and at least three pairs nested. They began booming early and were in full voice by the middle of March. The first nest to be found contained five eggs on April 6th and a second one had five eggs on the 17th. One chick of the earlier nest hatched on April 23rd and on May 1st both nests contained five young. Six bitterns were seen standing out on the marsh in the sun on June 12th, and on September 16th eleven were in the air at the same time.

Garganey teal were first noted on March 11th when three were on the Big Pool. These had increased to eight on the 27th. On May 10th three drakes were seen alone on the marsh, an indication that their mates were sitting, and on the 25th a duck appeared with nine ducklings. A second garganey with young was seen on June 5th.

Mallard, the commonest duck of the marsh, must have had an excellent season for between five and six hundred birds were estimated on the marsh on August 1st.

Eight pairs of common terns nested on the Salthouse side of the East bank and close to it. The Sandwich terns which were seen there in March and April did not settle down.

A pair of quail nested within a short distance of the marsh and were first seen by Major Aubrey Buxton on April 22nd. On May 6th they were flushed in a hayfield and again on June 15th when they had young which were judged to be about two days old.

Monthly Records.

January.

Eight whooper swans were seen flying westwards on January 1st.

On January 7th a large flock of pied wagtails, estimated at between sixty and eighty birds was feeding on the newly ploughed field south of the marsh.

Six shore-larks were on the Beach road on the 9th and had moved to little Eye next day.

A great grey shrike was sitting on the telegraph wires near the East bank on January 10th.

On the 17th there was a huge flock of chaffinches and bramblings feeding in the reed-beds on the marsh.

Six pintails were on the Big Pool on the 22nd.

February.

Reed-cutting was in full swing and little of special interest was noted. A hen harrier was seen quatering the marsh on the 13th and again on the 26th. Two woodcock were flushed on the 27th.

MARCH.

Thirty wild swans flying eastward on the 2nd were believed to be whoopers.

Two gadwall, formerly an infrequent visitor to the coast, were on the Big Pool on the 13th.

The first Sandwich terns were seen by Major Aubrey Buxton on the 19th.

An early stone curlew was seen on March 25th on the field to the south of the hut.

APRIL.

A party of twelve magpies, a bird which has increased enormously all over the Eastern Counties during the past ten years, was seen near the marshes on April 6th.

The first common terns arrived at Salthouse on the 10th.

On March 17th there was a big migration of house-martins and swallows all, as usual, travelling westward.

A black-tailed godwit was on the Salthouse marshes on the 20th.

A marsh-harrier flew over on the 22nd.

On the 29th many small birds including common redstarts were passing through and the first reeves were noted.

MAY.

The season was remarkable for the number of black terns noted in all the suitable places. They first appeared at Cley on May 4th and there were sixteen over the Big Pool on the 11th.

On May 10th, a black redstart was sitting on the garden fence of the Watchers Cottage.

Two avocets were on Salthouse marsh on the 19th and also a dusky redshank. Bishop notes in his diary on the last day of the month that he has located twelve pairs of nightingales within a mile of the East bank.

JUNE.

Most of the notes for this month are included under breeding species.

A red-backed shrike's nest with five eggs was found on the 3rd. A black tern was hawking over the Big Pool on the 11th. Common tern chicks began to hatch on the 20th.

JULY.

A very severe storm occurred on the 2nd with " hail as big as walnuts " which did much damage to wild life and to crops.

On July 3rd it was estimated that at least 200 young mallard were flying round the marsh. On the 13th of this month common and green sandpipers, forerunners of the return migration, began to arrive. A wood-sandpiper was seen on the 25th.

AUGUST.

A young bittern, which had apparently been killed by flying against the telegraph wires, was picked up on August 14th by Mrs. Jopling.

A whisp of snipe, estimated as forty birds, flew in to the marsh on the 18th. Waders began to arrive in numbers on the 16th and by the end of the month were all over the marsh. They included greenshanks, ruffs and reeves, curlew wood and green sandpipers, turnstones, knot, grey plover, bar-tailed godwits, a dusty redshank and several little stints. The number of curlew sandpipers was remarkable and it was estimated that, on some days, they represented half of the small waders present. Three black-tailed godwits were on the Salthouse marsh on the last day of the month.

SEPTEMBER.

On September 1st three buntings seen on the barbed-wire of the north boundary were thought by Major Daukes to be ortolans.

The waders which invaded the marsh during the last week of August remained until September 13th. On the 10th a Temminck's stint was identified with a party of little stints and on the next day there were two Temminck's. There was a big east to west movement of birds, noticeably lapwings, on September 13th, and it seemed as if the waders from the marsh

joined this for few remained next day. Five little auks were found sheltering on the beach on September 22nd following a day and night of severe S.W. gale with gusts which were estimated at a hundred miles an hour. Sandwich terns were collecting in considerable numbers on Salthouse marshes on the 23rd ; they all left next day. A merlin and a peregrine were seen flying over Cley marsh on the 25th. Two purple sandpipers arrived on the 27th and remained feeding along the sides of the Main Drain until October 8th.

The Bomb Disposal Unit began work on the concrete blocks of the East Bank and on the mines on the beach at the end of the month, and the few birds which had remained until then left.

October.

Small birds, including pied flycatchers and common redstarts, were present on the marsh on October 1st. On the 7th woodcock and grey crows arrived. There was a big movement of house-martins and swallows on the 9th, and in the evening of that day there were hundreds of them feeding over the reed-beds. A large immigration of chaffinches and bramblings took place on the 12th and the road fences were full of them. These birds remained until the 20th. Two black redstarts were seen on the 17th. On the same day two woodcock were seen coming in with three short-eared owls, known locally as the " Woodcock owl." Green plover and rooks were passing through all day long on the 20th.

November.

A pair of bearded tits, first reported on the marsh on Nov. 9th by Major Aubrey Buxton, were again seen in the reeds round the Big Pool by Capt. R. G. Buxton and F. W. Bishop on the 12th. A Manx shearwater was picked up on the beach by Bishop on Nov. 9th. A party of eleven waxwings were in the bushes of a gravel pit on the Cley Old Hall farm on November 10th. Also on the 10th Bishop reports the biggest migration of lapwings ever seen by him. They were passing, as always, from east to west, in tens of thousands throughout the morning.

NOTES FROM HORSEY

By Major A. Buxton.

This summer a freak cuckoo at Horsey was often heard performing within thirty yards of the house. I noticed nothing peculiar until after the arrival of the hen cuckoos about three weeks after the first cock had been heard, then this bird began juggling both with the "words" and the notes. It would repeat one of the two syllables often many times and give out one of them on a false note; in fact it produced any number of variations of the normal call. It was an annoying bird for when a visitor was told to listen, the bird would repeat an interminable series of normal "cuckoos." I think that the best variety performances were promoted by the presence of a hen bird for they generally followed her "chuckles."

The summer was remarkable for the number of goldfinches not only at Horsey but wherever I went in the County. In the garden they seemed to get most of their food from dandelions and daisies on the lawn.

Our normal home ration of spotted flycatchers is three pairs—the front door pair, the garage pair and the ponies' pair. These all arrived already paired and began to nest at once. An extra bird which tried to attach itself to the front door pair was only there for one day. The ponies' pair always nest in the same spot in some wire netting below the thatch of the shed. They never bother to make a new nest but merely add fresh materials to the old one, which remains firmly fixed in the netting. I imagine that one or both of this pair are the same individuals using this nest year by year. The pair at the front door were very bad architects and their untidy nest, placed on insufficient support, finally collapsed when the hen had begun to sit.

Last year we had no lesser whitethroats but they returned this season together with numbers of common whitethroats. The shortage this summer was in garden warblers, which normally exceed the blackcaps in the garden, but this year the position was reversed.

In mid-June when in Calthorpe woods with Mr. G. Crees we heard the song of a bird which puzzled both of us. It sounded like a combination of blackcap and garden warbler with obvious

imitations of a nightingale. We stalked the bird and eventually got a clear view : it was a normal blackcap and was I suppose fond of mimicking other birds.

The most obvious absentees this year were the jays. Normally there are two pairs in the garden and several more nesting in Brayden marshes ; this year there was only one pair in the garden and none anywhere else in the parish. I am not responsible for their disappearance.

It was a very good summer for yellow wagtails. They were so tame on the road through the marshes that I was nervous of running over them.

On the morning of May 31st I was in the bathroom, which faces north, and had the window shut when I heard the whistle of a cock oriole. I ran to an open window on the south side of the house and heard one more rippling whistle coming from beyond a gardener working there, but nothing more. The bird must have seen the man and slipped past him through the trees away to the north. Another was reported by Colonel R. E. Cubitt from Honing. On May 29th a carpenter in his employ, interested in Natural History, heard from the open shed in which he was working a loud and unfamiliar whistling accompanied by cat-calls. He looked out and saw a thrush with a brood of young much disturbed about something. It dived into a tree and out flew a bright yellow bird with black markings, obviously a cock oriole. The cat-calls almost certainly meant that a hen bird was present too but nothing more was seen or heard. On the same date, May 29th, Mrs. Russell Colman walking in the garden at Crown Point saw a bird fly up from a bed of bright yellow irises. She said " It might have been one of the irises with black stripes and was so brilliant that it made me gasp with astonishment."

On June 16th a pair of orioles visited Horsey and were within a few yards of the house for over an hour. We stood under the trees in which they were and listened to the whistling and warbling of the cock and the cat-calls of the hen but we only had occasional fleeting glimpses of the birds. This pair behaved like a settled couple rather than travellers and the date confirms this impression. A single cock was heard at 5 a.m. from the house a week later. I believe that this pair nested, or

attempted to nest, somewhere in the neighbourhood and that Horsey was just within the limit of their range, but although I trespassed in all directions I failed to find them.

A pheasant is the last bird I should have suspected of being musical. One Sunday afternoon in the spring my keeper, Mr. G. Crees, was in his sitting room with his daughter who was playing the piano. A cock pheasant which frequents his garden was seen standing outside the window with its head on one side as if listening ; when the music stopped it looked fussed, and when playing was resumed the bird again took up its attitude of close attention. A little later the cat appeared : fluttering its wings the pheasant charged and drove the cat round the garden.

There was not a single bearded tit at Horsey this summer and very few during the previous winter. However these birds seem to be holding their own at Hickling and also in Suffolk. Now, (November 26th) there are a fair number round Horsey Mere.

Bitterns were unevenly distributed. In the Somerton area there were six boomers but only two round Horsey Mere. We found four nests in which from two to five young were reared so that bittern prospects are good not only here but in many other places in Norfolk and Suffolk.

For the first time since I have been at Horsey a harriers' nest was robbed in spite of careful watching. The hen marsh harrier is an old friend, easy to distinguish, and has an excellent record for rearing every chick from large clutches of five or six eggs. This year the clutch of six eggs was robbed. Fifteen days later she began to lay again in a nest about three hundred yards from the first nest. This time there were five eggs all of which were hatched, but when the chicks were a fortnight old some men cutting reed in the neighbourhood apparently caused the parent birds anxiety. Anyhow lunch was late and in their impatience the three biggest chicks killed and ate the two smaller ones—not an uncommon habit of marsh harriers.

Further south was another cock marsh harrier and two hens, one dirty brown and the other almost black. The cock chose the brown bird and in spite of the darker one's constant flirtation refused to feed her. Later on another cock turned up

and took over this hen. The brown hen reared four young and the dark bird two.

One pair of Montagu's harriers settled to nest at Horsey but just as the hen was due to lay the water rose and they moved over the boundary to Hickling.

The increase in kestrels in 1946 is most remarkable, and is apparently universal in Norfolk.

Water-rails seemed very prolific. They all appeared to have two clutches and in June we found five second nests two of which had ten eggs each and the other three nine each.

A pair of garaganey teal reared a family at Starch Grass and there were also shovelers there, but neither teal nor shoveler has returned to nest at Horsey, as they did before the sea flood of 1938.

Again we had mute swans in numbers both in winter and summer but no nesting pairs. There were a few whoopers in the winter.

The whimbrel which passed through in May did not stop to feed on the marshes to the same extent as in 1945, and owing to the spring drought there was little shallow water to attract waders. Mr. Crees saw a green plover pick up one of its chicks, which had wandered too near the main road, carry it in its feet as it flew, and deposit it in the middle of the marsh.

There were great numbers of pochard but few tufted duck frequenting the Mere in the winter of 1945/46. A pochard that had fed on the Mere by day had a crop full of chara seed and a number of small snails. This autumn (1946) although flights of pochard came to the Mere in October only one small flock had settled up to mid-November. Possibly the chara seed had not yet ripened.

BIRD NOTES FROM HICKLING.

By E. Piggin.

Breeding Species.

Bearded Tits.—These were seen throughout the winter months. The first nest, a very early one, was found to have a clutch of six eggs on April 7th and these hatched two days later. Twelve nests were found up to the second week in May, all of

which reared young. There were other later nests which were not looked for. In October a party of fifteen birds were seen together and, provided this winter is not a severe one, there should be an excellent stock for next season.

Grasshopper-Warbler.—At least ten pairs were located.

Sedge and Reed Warblers.—Both species were as numerous as ever and many nests were found.

Montagu's Harrier.—There were two pairs in the area although their nests were not on the Whiteslea reserve. These reared eight young.

Marsh-Harrier.—Three pairs constantly seen over the Broad. Two of these nested at Horsey and one at Somerton.

Shoveler.—More than usual. Fourteen nests found.

Garganey Teal.—No nests were found but three ducks, each with very small ducklings, were seen later in the season.

Wigeon.—A duck with a brood of young, which must have been hatched in the area, was seen in the early summer.

Bittern.—These began booming exceptionally early. One was heard " grunting," the preliminary to booming, on January 27th. Altogether seven cocks were heard, indicating that seven pairs bred. Of these, two nests were found but the rest were not looked for.

Redshank.—A large number bred in their usual sites at Whiteslea. The first nest of the season was found to have two eggs on April 13th.

Lapwing.—There were so many of these, together with redshanks', on one marsh that it was difficult to walk without treading on them. The first nest was noted on March 30th, and this had two eggs on April 5th.

Great Crested Grebe.—Seven pairs had nests on the Broad, a record for Hickling.

Water-Rail.—More pairs were noted than for many years and two nests were found.

On February 25th, at midnight, as the result of the weight of very high water and strong wind, a breach was made in the Hickling bank and the Broad flooded the marshes to a depth of fifteen inches. This flood water attracted many duck, mallard, shoveler, teal and wigeon. It also drowned all the field mice etc. and was no doubt the reason for short-eared owls not staying to nest.

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Wood-Sandpiper at Whiteslea

Walter Higham

Migratory Species Visiting Hickling.

Blue-headed Wagtail.—One was seen on Heigham Holmes by Mr. C. Cadbury and E. Piggin on April 27th.

Osprey.—One arrived on April 28th and remained until May 4th. This bird was seen carrying a fish in its talons by Mr. Peter Mackenzie on May 2nd. Another osprey was on Swimcoats on May 9th.

Hen-Harrier.—Male and female both seen at the end of November.

Peregrine Falcon.—Two were seen on November 11th and a third in the latter half of the month.

Whooper Swan.—Seventeen flew over the Broad on January 27th and were joined by another party of nineteen in Heigham Sounds.

Wood-Sandpiper.—Five arrived on May 25th and were still about the next day. The beautiful photograph overleaf is of one of these birds which settled near Whiteslea Lodge. It is believed by Mr. Higham to be the first photograph of a wood sandpiper taken in this country.

Dusky Redshank.—Two were seen on Rush Hills on May 15th.

Green Plover.—A very big movement was noted on November 11th when thousands were passing over the Broad and adjoining area.

Black-tailed Godwit.—One seen on Rush Hills on May 6th.

Black-Tern.—A large number passed through during the spring and early summer. The first of these was noted on May 1st and the largest number seen together was fourteen on May 13th.

Sandwich Tern.—Five were seen on May 6th.

Black-throated Diver.—On January 31st one was within twenty yards of Piggin's punt.

There was so much rain during the summer that the wader grounds were badly flooded, and this is probably the reason for fewer interesting passage migrants than usual being seen this year. The water was too deep for them to rest.

An enormous immigration of starlings took place in November. These birds roosted in such numbers on the Broad that they have broken down large areas of the reeds and at an estimate have spoilt three quarters of the crop. They blackened the sky as they rose from their roosts.

NOTES FROM BREYDON

By Robin Harrison

Mr. Harrison has undertaken to be Warden of this area from the middle of April until September. Breydon Water is a tidal estuary formed behind Yarmouth by the junction of the river Bure with the Yare, and there is much traffic through this public waterway. For this reason it cannot be considered as a nature reserve, but it is a feeding area for duck and waders, and a resting place from time to time for such unusual visitors as the spoonbill and avocet. It is to protect these that Mr. Harrison, who has recently been made a Special Constable, has volunteered to keep a look out for illicit shooting during the summer months, and those who frequent Breydon for the pleasure of watching birds are most grateful to him.

The following notes are extracts from his diary for 1945.

Breeding Birds.

Breydon is not an important breeding area as there is no beach of any kind at high tide. Sheld-ducks nest in numbers at the Burgh Castle end where there is reasonable cover for them. The first brood this year was seen on June 2nd and by the middle of the month there were hundreds of ducklings on the mud-flats.

Lapwings and redshanks breed on the marshes adjoining the estuary. Unfortunately late harrowing of the meadows during this spring was responsible for destroying a great many of them.

Two pairs of oyster-catchers frequented Breydon and the adjoining meadows throughout the summer but no nest was found.

Common and little terns were abundant all the season due to the large colony nesting on the mined beach to the north of Yarmouth. Another colony has established itself on the Scroby Sands, the huge sandbank three miles off Yarmouth which gives shelter to ships in " the roads " in bad weather.

Birds of Passage.

There was nothing phenomenal as regards the number of waders passing through Breydon during the spring, although

there were days when an interesting variety of shore birds were to be seen there.

April 1st. Surprised a peregrine feeding on the remains of a lapwing on Breydon wall.

April 21st. Ten black-tailed godwits on the mud-flats at low tide.

April 28th. A dusky redshank in summer plumage seen near the Duffels rond.

Two grey-lag geese and one white-fronted arrived on a nearby marsh. The white-front left next day but the grey-lags remained close by a flock of tame geese until May 4th.

April 30th. Several bar-tailed godwits, knot and grey plover, some of the latter in full nuptial attire. Also large flocks of dunlin most of which were in summer plumage.

May 3rd. A flock of forty-two whimbrel on a marsh by the estuary wall.

Eight turnstones feeding on a shelly corner close to Hock-Gate Farm.

May 9th. A company of thirty knot all in summer " red."

May 12th. Kentish Plover. While punting over the estuary in company with Mr. F. C. Cook and Mr. E. W. C. Jenner we had the luck to see two of these dainty little shorebirds, the first one any of us had seen at Breydon.

May 14th. One black-tern hawking over the estuary.

The autumn migration began early. Whimbrel and golden plover began to put in an appearance on July 7th and from that date the number and variety of birds dropping in exceeded anything I've seen here for many years.

July 20th. A marsh-harrier flew over Breydon heading S.E.

July 21st. Whimbrel and many curlew on the mud-flats. Also two common gulls and four guillemots besmeared with crude oil, undoubtedly some of the victims of the oil menace which engulfed so many birds off the Suffolk coast at this time.

August 4th. A male Montagu's harrier was seen beating along low over the marshes behind the estuary wall.

August 10th. The number of waders increases daily. There are hundreds of curlew and a fine lot of whimbrel besides big flocks of small waders. These are difficult to identify on the huge expanse of mud at low water but most of them were dunlin.

August 18th. Thirty knot and fourteen bar-tailed godwits close to the house boat this morning. Also three greenshanks, eight turnstones, two green-sandpipers, several common sandpipers and hordes of dunlin, redshank and ringed plovers.

September 2nd. A Kentish plover, the second occurrence this season, was feeding on the raised marsh known as the " lumps " at high tide.

September 3rd. Three ruffs were feeding with redshank at the entrance of the Five-stake Drain.

September 11th. A big flock of knot and eighty-seven bar-tailed godwits on the mud-flats in the evening.

October 5th. Greenshank seen passing through. A company of 200 wigeon arrived in the estuary.

October 6th. A skein of eighteen white-fronted geese flying out to sea passed over the houseboat this morning.

On this day also I had the good luck to see a peregrine stoop and carry off one of a flock of dunlin. It came down like a meteor, seized its bird and recovered just above the mud-flats. Then, oddly enough, it was chased by the rest of the dunlin, and as it flew low over the wall near to me I could see its prey still alive and struggling in its talons. The peregrine bore its victim away over the marshes where it was mobbed by a kestrel but soon out-distanced it.

Scandinavian Lesser Black-Backed Gull.

A dead bird bearing a ring was picked up at Breydon on Sept. 5th. Information received from the British Bird Ringing Association was that the bird had been ringed as a nestling ten miles south of Gothenburg in 1945. It was the first recovery for this species since 1935, and the third only for the British Isles.

MISCELLANEOUS NOTES.

MAGPIE

A flock of thirty-nine magpies was seen on Northwold Fen on July 26th. The birds rose from a large thorn hedge by the side of a field of peas (C. F. Tebbutt).

This species was comparatively scarce in Norfolk, except in the extreme south and west borders of it, until about ten years ago. Now it has spread all over the County and has become so numerous in recent years that it is looked upon as a nuisance.

ROCK PIPIT

One was on Duffels rond at Breydon on January 9th (P. Browne).

TWITE

A flock of sixteen was flushed from the wall at Breydon on January 20th, and two were identified on the 21st on the south wall. (P. Browne.)

SHORE-LARK

On January 21st a shore-lark was feeding with a party of sky-larks on the marshes adjoining Breydon wall. Another was seen there on the 31st. (P. Browne.)

WAXWING

The immigration of waxwings, first reported in Scotland, reached Norfolk early in November. The first to be recorded in this county were seen by W. F. Bishop at Cley on November 10th. On November 21st Mr. E. A. Ellis saw a small party fly over his punt at Wheatfen and settle in some bushes nearby. These increased and were present in large numbers by the end of the month. Another record is of a party of fifty seen at Claxton by Mr. R. Sewell.

COMMON REDSTART

A cock bird was in a fir tree by the side of a derelict barn at Croxton, on April 6th. (John G. Parker.)

BLACK REDSTART

Two seen at Sheringham on October 20th. (G. Marsham.)

GOLDEN ORIOLE

A cock bird was at Merton, near Watton, from the latter half of July until September 14th. It was frequently seen by a number of people including Lord Walsingham, on

whose property it was, and Mr. Keith Murray who was fairly certain that he caught a glimpse of a female as well, a greenish bird which was very shy. No nest was found and no young were seen (unless the greenish bird was one) but, as Merton lies on the edge of the battle training area, the nest could easily escape detection.

Crossbill

On April 2nd a small flock of a dozen crossbills were noticed in the Scots fir trees of my garden in Newmarket Road, Norwich. They first attracted attention by the clicking noises made as they ripped off the scales of the fir-cones in order to extract the seeds. Most of the birds had greyish-green plumage but at least one cock bird showed traces of red. They remained in the neighbourhood until the evening of April 6th when I last saw them feeding voraciously. (G. J. Cooke.)

Lesser Spotted Woodpecker

For several weeks in April and May a lesser spotted woodpecker used the top of an old aerial mast adjoining the garden as a signalling post. It inserted its bill in a crack at the top of the pole and gave an excellent demonstration of "drumming" by rapid movements of its head. The note produced seemed sharper, and more vibratory than that of the great spotted woodpecker, but this may have been due to the pole. (G. J. Cooke.)

Long-Eared Owl

A pair at Swanton Morley used a nest in a Scots fir tree in a small covert and reared four young. The nest was occupied in 1945 by a pair of sparrow-hawks. (E. C. Keith.)

Hen-Harrier

An adult male was seen flying over Didlington lake on January 17th. The white rump and black tips to the grey wings were clearly visible. (John G. Parker.)

Rough-Legged Buzzard

A buzzard identified as a rough-legged was seen at East Wretham heath on January 12th and again on the 17th. Another bird of this species was at Wretham on April 10th and a good view was had of it in flight and also as it alighted, facing us, on the bough of a tree. (John G. Parker.)

OSPREY

Lord Walpole reported one in April on his estate, Wolferton Park, where it was seen over the lake. Another was at Hickling in May. (See Notes from Hickling.)

CORMORANTS INLAND

Four cormorants flew over the Mundford-Thetford road about four miles from Thetford as I was cycling along it on April 10th. (John G. Parker.)

WHITE-FRONTED GOOSE

A flock of about 800 were feeding on the marshes to the north of Breydon on January 30th. (P. Browne.)

BEWICK'S SWAN

Three were in company with one whooper and one mute swan at Horsey on January 31st. (P. Browne.)

SMEW

A red-headed bird was swimming in the Yare opposite Berney station on January 21st. On the 24th it had apparently reached Breydon and was swimming near the wall in the vicinity of the "dickeyworks," the local name for the Breydon breakwaters. (P. Browne.)

HERON

Holkham Heronry.—C. Chestney counted seventeen nests here on March 31st. There was evidence of some of the nests having been blown away in recent gales, and a number of egg-shells lay on the ground beneath the trees. Some of the nests counted contained young and some herons were re-building.

Wickhampton Heronry, near Reedham.—It was estimated on March 10th that there were twenty occupied nests some of which contained eggs. A later visit showed that forty pairs were nesting in the heronry. (R. Harrison.)

N.B.—Mr. Robert Hinde is collecting statistics in regard to heronries and will be grateful for information of those in Norfolk, particularly of any new ones. His address is 31, Mount Pleasant, Norwich.

SOLITARY SNIPE

A bird of this species was flushed from a hedge near the marshes at Yarmouth by my dog on January 16th. It gave no cry and appeared much larger than a common snipe.

It flew low and apparently lit nearby like a Jack, but we did not see it again. (Dr. L. Ley.)

Yellowshank

On October 2nd Mr. G. M. King saw a bird on the Salthouse side of the Cley East Bank which he believed to be a yellowshank, though whether a lesser or a greater he could not say. His first impression was of a greenshank with yellow legs and later, when it was feeding with two redshanks, it appeared definitely larger than these. He watched it through a telescope for a considerable time but did not see the bird in flight. Unfortunately no other ornithologists were on the bank at the time for collaboration, and next day three dredgers and a bulldozer began work on the marsh in preparation for the mine-demolition squad, and all the birds there left.

Glaucous Gull

An adult bird was flying westwards along the beach at Sheringham on November 2nd. (G. Marsham.)

Fulmar

There were sixteen fulmars at Sheringham in May but although I was able to climb to some of the ledges frequented by them, I could find no signs of nesting. The birds appeared to be immature, rather blue on the back and pure white beneath whereas the adult is tinged with yellow. (G. Marsham.)

Fulmars were also occupying holes in the cliffs to the west of Cromer, but the hole between Cromer and Overstrand, where birds were seen in 1945 had disappeared with a fall of cliff. It seems possible that the instability of these cliffs might be the reason for the apparent reluctance of these birds to colonise them, for fulmars have been seen resting in holes in them since 1939.

Eastern Turtle Dove

On January 9th, during a pheasant shoot at Castle Rising, a turtle dove was flushed from a covert by the beaters and shot by one of the guns. It was sent to Norwich Castle Museum for identification and proved to be a specimen of the Eastern Turtle Dove (Streptopelia orientalis). The

distinguishing features were the large size, the dark slate-blue rump, and grey instead of white under tail-coverts, tips of neck patch feathers and ends of tail feathers. The bird was badly damaged but it appeared to be completing a moult from juvenile to first winter plumage. It proved on dissection to be a female. It may have been an " escape " but a letter in the " Eastern Daily Press " asking for information as to any known to have been kept in aviaries met with no response.

The bird was identified by B. B. Riviere, F.R.C.S. and E. A. Ellis.

Quail

Miss Todd picked up a quail on the lawn of Mundham House, near Bungay, on January 11th following a period of very strong winds, which reached gale force on the night of the 10th.

Partridge

At Holkham Lord Leicester put a clutch of partridges' eggs under a bantam and these hatched out. The covey was quite tame but a pair of wild partridges coaxed away all but two of the chicks. These remained on the lawn by the house and were absolutely tame with human beings although they kept a watchful eye on the sky and ran under a bough for covert if a jackdaw passed over. At breakfast time each morning they walked through the open door into the dining room and went behind a screen to play. This consisted of a sudden raising of the shoulders and a ruffling of feathers which made a little noise like an umbrella opening and was accompanied by a jump. The other bird jumped to one side and also ruffled its feathers. One day the motor mower on the lawn backfired and so frightened the partridges that they flew off and were away for ten days. Then they returned, looking rather pinched, and were just as tame as ever.

Another interesting record from Holkham Park is of a pair of Egyptian geese hatching out a brood of ten on October 27th.

Signed (on behalf of the Council of the Norfolk Naturalists Trust)

Constance E. Gay, *Secretary*.

VII

A NOTE ON THE PHYSIOGNOMY OF GLYCERIA MAXIMA REEDSWAMPS IN NORFOLK.

By J. M. Lambert

(Westfield College, University of London).

The " Broad-leaf " or " Reed Sweet-grass," *Glyceria maxima* Hartm. Holmb. (until recently generally known in this country as *G. aquatica* (L.) Wahlb.), is a common and widely distributed reedswamp species in Norfolk, often forming extensive and almost pure colonies in ponds, ditches, and along river banks. Moreover, large expanses of *Glyceria* form a very characteristic phase in the general plant succession from the open water of the Broads of the Yare Valley, although for reasons outlined elsewhere (Lambert, 1946), it is absent or only poorly represented in the primary succession from the Broads of the other East Norfolk river valleys.

Although *Glyceria*, like *Phragmites communis* Trin. (the common reed) has a considerable vertical range in relation to the water table and frequently dominates marsh and fen areas where the water level sinks well below the surface during the summer, it is perhaps most characteristic of reedswamp regions where the rhizomes are submerged throughout the year. One of the most striking features which has emerged from a general survey of *Glyceria* reedswamps from various types of aquatic habitats is the considerable difference in general physiognomy of such reedswamps and in the actual growth habit of the plant itself ; it is thought that these differences depend very largely upon mechanical differences in substrate texture, but nevertheless they appear to have a very definite biological significance in relation to the autecology of the species, and this may partly account for the fact that it is both abundant and widely distributed, and competes successfully with taller and more robust reedswamp plants under certain defined conditions.

The most typical *Glyceria* reedswamp is one in which the rhizomes are firmly anchored in the substrate, where they spread horizontally at an average depth of 10-15 cm. (cf. Fig. 1),

Rectilinear view of an erect anchored Glyceria maxima reedswamp at a bend of the River Yas, near Stoke Holy Cross, Norfolk. Photograph taken August 10th, 1940. The plants are at their maximum vegetative development for the year, and the fruiting heads can be seen projecting above the general level of the vegetative shoots. The river water level is exceptionally low, its usual height being indicated by the dark line some distance up the *Glyceria* stems.

PHOTOGRAPH 2

Typical floating Glyceria reedswamp bordering the north side of the present Surlingham Broad. Leaves of *Typha latifolia* and a few shoots of *Phragmites* can be seen in the foreground projecting well above the general level of the *Glyceria*. Photograph taken August, 1945.

giving rise to erect aerial vegetative shoots up to 200 cm. in height, and with flowering haulms up to 250 cm. This type of reedswamp is characteristic of all areas with a firm substrate, and is especially found along river banks where there is sufficient current to prevent the accumulation of a deep layer of loose oozy silt along the margins where the reedswamp would be developed (see Phot. 1.).

In the still water of land-locked ponds, however, the partially decayed vegetable debris from the aquatic vegetation frequently results in the formation of a very loose oozy surface deposit, often many centimetres thick, above the original firm inorganic bed of the pond. Under such conditions, the superficial rhizome system of the encroaching *Glyceria* reedswamp would normally be situated in these top layers of loose ooze ; but beyond a certain depth of water, the natural buoyancy of the plant becomes too great for the anchorage afforded, with the result that the inner margin forms a floating raft, generally firm enough to support the weight of a person, but swaying with every footstep. A good example of a reedswamp of this type may be seen at Earlham, where there is a fairly large land-locked pond in the Upper Yare Valley ; the same phenomenon may also be seen on a smaller scale in the village pond at Surlingham.

The conclusion that the floating inner margin of such reedswamps is dependent upon the mechanical properties of the substrate, and is not a biological adaptation of the plant itself to meet the exigencies of increasing depth of water towards the centre of the pond, is supported by the fact that in other still water areas, where this surface ooze is poorly developed (as in the fairly large village pond at Lingwood), the inner edge of the encroaching *Glyceria* reedswamp is always anchored, with evidence that the plant is here not able to advance beyond a certain depth of water in contrast to the theoretically unlimited encroachment of the floating type of reedswamp.

The best and most characteristic development of the floating *Glyceria* reedswamp is however seen in the tidal Yare Broads themselves. The substrate of these Broads is a deep oozy organic silt, often forming a layer several feet in thickness ; it is especially soft and yielding in the larger open water areas,

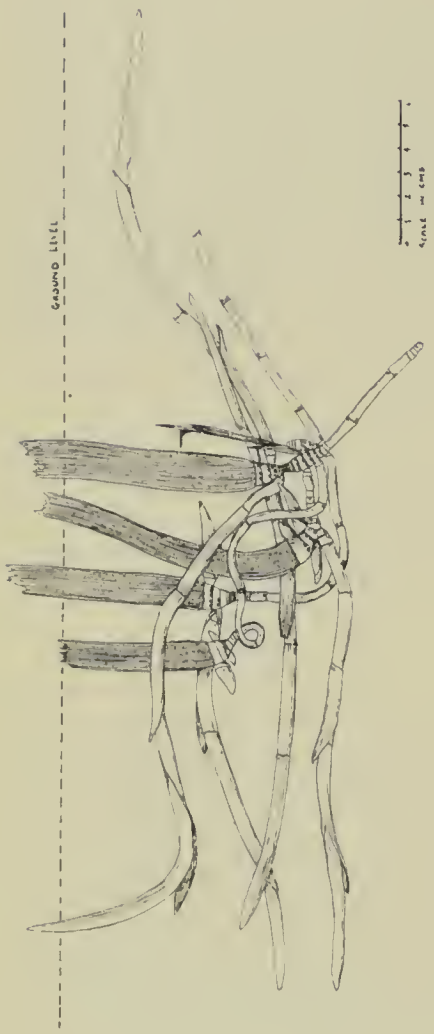

FIG. 1.

FIG. 2.

FIG. 1.

Part of the shallow rhizome system of a typical anchored Glyceria reed-swamp with erect aerial shoots. Material collected on May 23rd, 1941, from ox-bow pond in the flood-plain of the River Don, Rotherham, Yorks. The roots and decaying leaf bases of the old leaves have been removed for the purpose of drawing, and their positions indicated by scars.

FIG. 2.

Morphology of the distal portion of a green prostrated vegetative shoot from the marginal region of floating Glyceria hover.

Material collected from Surlingham Broad April 14th, 1941.

The whole stem, which was green throughout, was 150 cms. long from the point of junction with the parent rhizome, and with 14 additional nodes proximal to those drawn. It was submerged for about half its length, running just below the surface of the water, with the terminal foliage leaves and taller lateral shoots of the distal region projecting. The shoot is obviously one which had been produced the previous year and had overwintered in the living condition, producing new roots and lateral shoots the following spring. Proximal to the portion drawn, no lateral shoots were well developed, and in many cases the buds themselves were decayed and soft to the touch.

(a) green prostrated stem of previous year's growth.

(b) terminal green foliage leaves.

(c) undeveloped axillary bud.

(d) lateral shoot developed from axillary bud.

(e) junction with portion of stem omitted from drawing.

(f) node with previous year's roots and undeveloped lateral shoot (similar to proximal nodes not shown in the drawing).

(g) thick white newly-formed roots.

(g′) thinner brownish older roots bearing laterals and produced previous year.

(g″) root running parallel to stem due to encasing leaf sheath (removed for purpose of drawing).

(g‴) young root arising from basal node of lateral shoot.

where the force of the tidal flow is expended over a greater surface so that the finer particles of silt are deposited. The upper layers of this silt are so loose that they appear to be practically suspended in the water, and the very ineffective anchorage offered to the shallow rhizome system of *Glyceria* is more than counteracted by the recurrent lifting effect of the tidal water, which has an average rise and fall of as much as 30 cm. in the Surlingham-Rockland area. The floating masses of *Glyceria*, which surround these Broads in all parts where scour is not too intense, are locally known as " hover " (see Phot. 2) ; they contrast well with associated *Phragmites* reedswamps, which have a more deeply seated rhizome system and can remain anchored in the deeper layers of the ooze.

The growth habit of *Glyceria* itself appears to vary considerably, according to whether the reedswamp is of the anchored or of the floating type. In all descriptive literature already consulted, *Glyceria* is invariably recorded as erect in habit, although Armstrong (1917) notes a tendency for the stems to creep and root at the nodes. However, the aerial stems, though apparently robust, have relatively little strengthening tissue in relation to their bulk and height, and a fully erect position is only possible when the rhizomes and basal parts of the haulms are immersed in a sufficiently firm substrate to give adequate support to the aerial portions. In the absence of such support, the aerial shoots show a marked tendency to overbalance and to become partially or entirely prostrate at an early stage of growth. This is especially the case towards the edge of the reedswamp, with the result that the latter is characterised by a fringe of horizontal floating shoots, morphologically identical with the normal erect shoots, but with only the last 30-40 cm. projecting above the general water level (Phot. 3). Towards the centre of the floating mat a slightly more erect habit may be attained, but even here the shoots rarely achieve the fully erect position characteristic of the anchored reedswamps. The prostration of the shoots is especially marked when the floating habit is combined with maximum exposure to wind and rain, as in the extensive open spaces of the Broads district ; under such conditions, an early prostration of the *Glyceria* shoots may be brought about as the normal course of events even on a firm compact substrate.

PHOTOGRAPH 3

Profile view of a floating Glyceria reedswamp in "The Bays," Wheatfen, showing the marginal fringe of almost completely prostrated shoots with their upturned ends projecting above the water. Photograph taken August 28th, 1941.

PHOTOGRAPH 4

A small detached portion of Glyceria hover temporarily lodged with other debris near a sluice gate in a drainage dyke at Coldham Hall. Photograph taken August, 1943.

As a direct result of such prostration, the long vegetative shoots are immersed in water, or in close proximity to it, for most of their length. This point is significant in relation to the overwintering of the plant. The aerial shoots are normally recorded in descriptive literature as dying off in late autumn, with the new spring growth arising as new shoots from the rhizome region [cf. for instance the detailed description of the morphology of *Glyceria* given by Raunkiaer (1895-9]. In contrast to this course of events seen in typical erect anchored reedswamps, the majority of the prostrate shoots of the floating reedswamps remain alive throughout the year, and although the older leaves towards the base of the shoots may decay, the young leaves of the upturned tips remain conspicuously green and apparently unaffected by the most severe winter.

The ability of this marginal fringe of trailing vegetative shoots to overwinter in the living condition is an important factor in the rate of encroachment of the floating reedswamp on open water. Unlike the erect aerial shoots, adventitious roots are produced abundantly at the nodes along almost the whole length of the immersed prostrate shoots, with a corresponding outgrowth of the lateral buds (cf. Fig. 2) ; the latter often form robust secondary shoots, which, like the parent shoots, also soon become prostrate. When these secondary shoots are produced near the tips of the original parent shoots, the rate of encroachment of the advancing fringe of the reedswamp is far greater than if the new advance shoots arose only from the less extended rhizome system ; some three or four generations of new vegetative shoots may be produced successively from each other in any one growing season, and the straggling fringe so formed is rapidly consolidated by the production of smaller laterals from the basal nodes of the new shoots themselves (cf. Fig. 3). The persistence of the main prostrate shoots throughout the winter moreover ensures that the newer parts of the encroaching fringe remain attached as an integral part of the reedswamp until such consolidation has been brought about.

The following illustrative table is compiled from details of five floating shoots taken at random from the marginal fringe of hover in Surlingham Broad. The analysis was made on December 28th, 1943, and indicates the overwintering condition of such shoots.

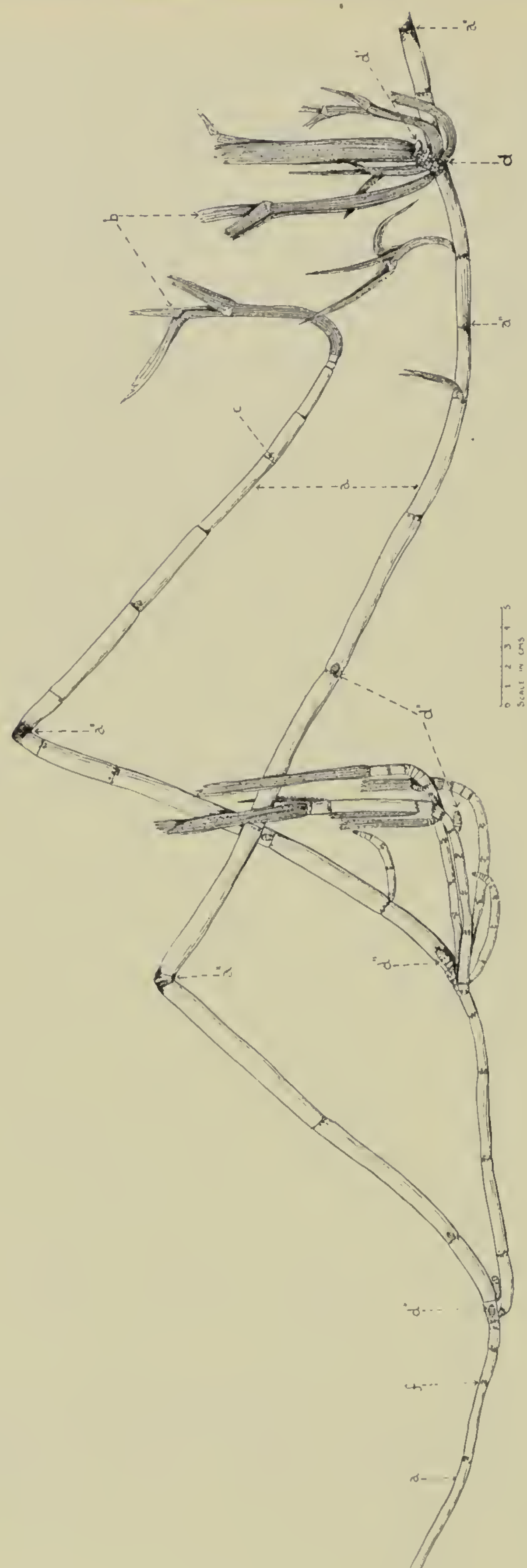

Fig. 3.

FIG. 3.

The overwintering condition of prostrated aerial shoots from the marginal fringe of a floating reedswamp.

Material collected from Surlingham Broad on April 1st, 1944, about three weeks after the commencement of the growing season.

The two main shoots, which are of successive generations, were formed during the previous year. In this case, the immersion of the distal ends of the shoots has been brought about by a definite break in the stems ; the latter have begun to decay in the region of the break, so that the distal portions would easily be set free with excessive water movement. The tip of the older and longer of the two stems has also decayed away or become detached, but a robust lateral shoot, itself producing laterals and rhizome initials, has been produced behind this point. The upturned tip of the younger of the 1943 shoots is still green and vigorous, and in this case no lateral shoots have yet been produced from the buds in the distal region.

The decayed leaf sheaths from the older parts of the stems have been removed for the purpose of drawing ; the roots have also been cut off, and their positions indicated by circular scars.

(a) floating green vegetative shoots formed in 1943.

(a′) white rhizomatous region of stem.

(a″) decayed or decaying portions of stem

(b) living green foliage leaves.

(c) dormant lateral bud.

(d) group of tillers developed from lateral shoot towards distal end of main stem.

(d′) small young lateral shoot with green leaves and functional growing point.

(d″) poorly developed older lateral shoot in which leaves have decayed and growing point is no longer functional.

(e) point of junction of whole system with parent rhizome.

(f) nodes of stem with scars showing position of roots before latter were removed.

No. of shoot.	1	2	3	4	5
Total length of stem from junction with parent rhizome to upturned leafy tip.	200 cm.	120 cm.	171 cm.	105 cm.	103 cm.
No. of nodes ditto ...	23	18	18	10	17
No. of nodes (from base upwards) at which roots had been formed	All	1, 4, 6, 8, 10, 12–18	All	All	All
Nos. of nodes at which leafy lateral shoots had been formed.	11, 12, 14–23	1, 10, 12–18	Only at tip.	1–4, 7–9,	6, 11–13

Since these shoots were collected in midwinter, the new spring growth of laterals had not begun, and although some buds had started to develop the previous autumn, these had in most cases only produced small and relatively insignificant shoots ; the subsequent spring production of new roots and vigorous tillers would be expected to take place mainly at the younger nodes in the region of the upturned tip, and this was generally observed to be the case.

It is not intended to imply that the production of tillers along the prostrate immersed shoots is by any means a characteristic confined to *Glyceria* among acquatic grasses. A similar encroachment of *Phragmites* on open water by means of tillers produced from prostrated and immersed haulms was described by Reissek as early as 1859. The significance of this in the case of *Glyceria* however lies in the fact that encroachment on open water by this method appears to be a normal and characteristic feature of the floating reedswamps, whereas in *Phragmites* the prostration of aerial shoots appears to be the exception rather than the rule*, and as Reissek himself points

*At Walberswick, on the Suffolk coast, prostrate propagating shoots of *Phragmites* up to 5 metres long were seen on beach sand at the edge of a creek reed-bed in process of becoming overwhelmed by the sand, in the summer of 1946 (E. A. Ellis).

out, is generally confined to isolated shoots. The same phenomenon has also frequently been observed in overhanging shoots of *Phalaris arundinacea* (Reed Canary Grass), but since this species is rarely a pioneer in colonisation of open water (though it may occupy a later phase in the succession), the habit has again less significance than in *Glyceria*.

Although the marginal portions of the floating reedswamps are well linked with the more stable parts behind them by a mass of intertwined roots and rhizomes, nevertheless, in areas with any degree of scour, floating masses of hover of varying sizes (cf. Phot. 4) are readily detached, especially during high flood tides in winter; floating *Glyceria* hover "islands" up to 30 m. long and 10 m. wide have been seen at times in Surlingham Broad, though they are normally much smaller in extent. Since these floating islands may increase considerably in size before finally becoming lodged in a new area, this easy disintegration of the edge of the reedswamp is an important factor in the distribution of the species; observations so far made show that *Glyceria* rarely reproduces from seed under natural conditions, but the size and abundance of the detached floating masses makes them very effective in establishing new colonies.

There is naturally no strict demarcation between the floating and erect anchored types of *Glyceria* reedswamp, and Tansley (1939) has described river colonies of *Glyceria* with procumbent free-floating leafy shoots and rhizomes at the outer edge, a state which is characteristic of many of the Norfolk rivers in reaches with a sluggish current. In such cases, the same disintegration of the margin may be brought about by winter floods, though here the detached units generally consist of isolated shoots or small groups of tillers instead of the larger and more effective masses of the Broads.

Although *Glyceria maxima* is apparently (by reason of its morphological structure) more able than any British reedswamp species to produce stable floating mats capable of further encroachment, it is by no means the only species which produces such mats in response to loose substrate conditions. W. G. Dyson (*in litt.*, 1945) reports the occurrence of floating reedswamps of *Scirpus lacustris* (the true Bulrush) in still water at Brereton Pool, near Middlewich, where the clay water-holding pan is covered with a considerable depth of very soft black

organic ooze and the margin of the bed of *Scirpus* forms a floating raft beyond a water depth of about 1 m. Clapham (in Tansley, 1939, p. 464) describes floating mats of *Typha latifolia* (Great Reedmace) at Sweat Mere in Shropshire ; small subsidiary floating colonies of *Typha latifolia* also occur in the Yare Broads within the broader limits of the *Glyceria* reedswamp, but these mats have a far more unstable appearance than the surrounding *Glyceria*, and without the protection of the latter it would be extremely doubtful if they would remain intact for any length of time under conditions of lateral water movement. Unlike *Glyceria*, where the centre of gravity of the whole reedswamp is lowered by the prostration of the aerial shoots, the more rigid spear-like shoots of *Typha* remain erect, supported solely by the mat of floating rhizomes. The mat itself, lacking the reinforcement of intertwined leafy vegetative shoots, is a far more open structure than that of *Glyceria*, and is consequently far less effective in resisting disintegration by external mechanical forces.

Available evidence suggests that *Glyceria* is rather exacting in its mineral requirements, and hence it is restricted in its general distribution to areas in which these are met. Within such areas, however, it is one of the more ubiquitous of reedswamp plants, since owing to its ability to form stable floating rafts, it is able to exist under substrate conditions which are mechanically unsuitable to other superficially anchored reedswamp competitors with very similar ecological requirements but with a more rigid growth habit. A particular case in point is that of *Sparganium erectum* L. (Branched Bur-reed), which is a very frequent associate of *Glyceria* on stable substrates, often forming an inner zone to the latter along river banks and in firm-bottomed ponds ; this plant is completely absent from the soft oozy margins of the tidal Yare Broads, although it is present in patches along the hard banks of the tidal dykes by which the Broads are connected with the main river, and also along the banks of the Yare itself in the same area. *Acorus calamus* (Sweet Flag) and *Carex riparia* (Marsh Sedge) may be quoted as similar examples.

In conclusion, it may be interesting to make some comparison between the floating *Glyceria* reedswamps already described

and the large floating masses of " Plav " described by Pallis (1915) for the Danubian delta, (the latter being the only other floating reedswamp described in detail in literature so far consulted). These " Plav " masses are thought by Pallis (1915) to represent the ultimate stages in the development of the *Phragmites* reedswamps of the area, and to consist mainly of vertically running axes, the whole mass of rhizomes and accumulated debris becoming detached from its original basal anchorage by lateral mechanical pressure exerted by the surrounding water; this detachment is facilitated by the readiness with which the substrate is worn away in the basal region where the erect axes are less numerous, so that the whole structure becomes undermined. Hence in the " Plav " masses, the floating habit is only attained at an advanced stage in the development of the individual reedswamp, *by actual severance of an original basal connection with the substrate;* on the other hand, in the floating *Glyceria* reedswamps, such a basal connection never exists, *and the reedswamps are free-floating from their inception.* Moreover, in contrast to the vertically-running *Phragmites* rootstocks of the " Plav," *Glyceria* hover is composed mainly of rhizomes and prostrated aerial shoots running horizontally. Yet a third point of contrast lies in the fact that the late attainment of the free-floating state in the " Plav " masses results in the accumulation of a considerable quantity of vegetable debris and mineral matter round the rhizomes, so that at the time of liberation the stiff aerial shoots are possessed of adequate basal support to enable them to maintain an erect position; on the contrary, the floating *Glyceria* masses represent the most recently formed parts of the reedswamp, and there is no comparable accumulation of debris to support the aerial shoots. Any resemblance therefore which the floating *Phragmites* " Plav " may bear to the floating *Glyceria* hover is merely superficial; actually, the two are entirely distinct in both structure and mode of origin, and consequently in ecological status and significance. The original suggestion made by Antipa (1912) for the origin of " Plav "—a suggestion later discountenanced by Pallis—is far more applicable to the formation of detached floating *Glyceria* mats than of " Plav " itself.

SUMMARY.

1. Observations made on a range of *Glyceria maxima* reedswamps have shown that they differ considerably in general physiognomy, and that these differences may be directly related to mechanical substrate conditions.

2. On firm substrates, the reedswamps are of the normal anchored type, with erect aerial vegetative shoots arising from a fairly superficially situated rhizome system.

3. In open water areas with a loose basal ooze, insufficient anchorage is afforded to counteract the natural buoyancy of the plant beyond a certain depth of water, resulting in the formation of floating mats and concomitant prostration of the vegetative shoots owing to lack of basal support.

4. The ecological significance of the floating habit is considered in relation to the rate of encroachment on open water and the production of detached propagative units.

5. Comparisons are made with other reedswamp species which are known to produce similar floating mats under the same substrate conditions ; it is concluded that the vegetative morphology of *Glyceria* is such that it is better adapted to the formation of such mats than many of its competitors with a more rigid growth habit.

6. A further comparison made between the floating *Glyceria* mats and the superficially similar floating *Phragmites* islands of the Danube basin shows that the two are neither comparable in structure and mode of origin nor in ecological status and significance.

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VIII

OBITUARY.

RUSSELL JAMES COLMAN.

Sept. 5th, 1860—March 22nd, 1946.

Russell Colman stands out as the leading Norfolk personality of his day. He was more universally known and more influential than anyone else in the County—moreover, he was more universally loved.

He had a real flair as Chairman of Committees, whether official or unofficial and it was a constant pleasure to sit under him, whatever the business. He was Chairman of the Norfolk County Council for 16 years, 1925—41, and of the Port and Haven Commission for 24 years: he had a light touch, was very quick not only at getting through the business, but at seizing on the important point and gripping the main issue. Moreover he could always make everybody present laugh and knew exactly when to do so. His was a master hand at securing a fair compromise.

Russell Colman revelled in the Norfolk language, in fact it was his native tongue. No doubt this was one, but only one, of the reasons which made him such good company in every walk of life. He was very sympathetic and could put himself at once in the other person's shoes and so encourage an opening of their mind.

He never pretended to specialized scientific knowledge but was very enquiring and observant, taking the liveliest interest in all questions connected with Natural History and in particular with the work of the Norfolk Naturalist's Trust and Society. His main recreations were yachting, shooting and fishing. In them and in everything else he did he entered into the fun of the business, and nobody and nothing could be dull if he was there. Right up to the end of his long life he was intensely young,—grand company for a school boy, or for that matter for a bishop or a cabinet minister.

To him the Norwich Museum was a beloved godchild and in his will he left to the City his unique collection of pictures of the Norwich School, in particular his Cromes and Cotmans, together with funds for a gallery suitable to house them. He delighted in showing these pictures to his guests at Crown Point and it was a treat to them partly because it was also so obviously a treat to him.

HUGH WORMALD.

My tame jackdaw " Joe " secured me my first introduction to Hugh Wormald over forty years ago at Cambridge, and from 1906—except for the war years—we worked together at Dereham first as game farmers and later as breeders of ornamental waterfowl.

During our long and happy association I had ample opportunity of appreciating Hugh Wormald's wonderful knowledge of birds and animals, and of observing not only his many successes in horticulture—more particularly with daffodils, rhododendrons and flowering shrubs—but also his prowess as a marksman, for after an injury to his shoulder he could still hold his own in good company though only able to shoot with a .410. It was characteristic of him that he refused to be daunted by this mishap, but at once set about overcoming it.

A very keen and skilled observer, birds were from first to last his chief delight ; starting as a boy with a collection of waders, he had an almost uncanny faculty for handrearing young birds of any species and perhaps his greatest triumph—which I was privileged to share—was the rearing to maturity of a common snipe which was hatched in an incubator. " John," as the snipe was called, lived for nearly two years, and though kept fullwinged was absolutely tame and would always fly back to his master's hand. Another interesting bird which he successfully reared from a nestling was a nightjar, and Norfolk plover, terns, ring plover, and woodcock, to list only a few, were all brought up by hand.

After the first world war, our attention was concentrated on the breeding of various waterfowl, and here too he succeeded

where many others had failed, and such rare species as Barrows goldeneye, canvas back and Argentine red shoveler as well as many varieties of foreign teal bred freely on our ponds, the ducklings in most cases being handreared under bantams.

His advice was much sought by aviculturalists and horticulturalists alike, and he contributed many articles to the technical journals, often beautifully illustrated, for he was a skilled artist, having studied under George Lodge.

He had a wonderful faculty for making friends in all classes of society, and there was nothing that he would not do to help them. Some of his happiest days were spent at Hickling, and on the afternoon before he died he was keenly discussing plans for the coming season there.

As I left his bedside, he called me back to point out to me a fine cock bullfinch feeding on a prunus tree in the garden—perhaps it was only fitting that a bird should be the first and last link in our friendship.

C.McL.

PRESENTED
SEP 1947

MEMBERSHIP.

The Society consists of two classes of Members, viz., Ordinary and Honorary Members.

Ordinary Members may be proposed and elected at any meeting of the Society. The Annual Subscription is 10s., payable in advance on election, subsequent subscriptions becoming due on the last Tuesday in March annually. This subscription may be compounded for by a single payment of £8.

Ladies and Gentlemen distinguished for their attainments in Natural Science, or who have rendered valuable services to the Society, may be nominated by the General Committee as Honorary Members, and elected by a show of hands at the next meeting of the Society. Such Honorary Members have all the privileges of Ordinary Members.

SALE OF TRANSACTIONS.

Copies of past issues of this Society's Transactions may be obtained upon application to the Assistant Secretary, c/o The Castle Museum, Norwich, at the following rates :—

All parts of the current volume will remain at full publication price (10 shillings), and thereafter be obtainable at 2s. 6d. for each part, save that no part shall be sold at the reduced rate until three years after publication. The Society's stocks of early numbers have been drastically reduced recently and some parts are out of print (chiefly in Volumes 1 to 8.)

BRITISH MUSEUM
NATURAL HISTORY
PRESENTED
12 SEP 1947

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96.

22 APR 1948

TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

FOR THE YEAR

1947

VOL. XVI PART IV.

EDITED BY MAJOR A. BUXTON

NORWICH
PRINTED BY THE SOMAN-WHERRY PRESS LTD., NORWICH.
FEBRUARY, 1948

PRICE 10/-

PAST PRESIDENTS

REV. JOSEPH CROMPTON, M.A.	1869—70
" " "	1870—71
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MICHAEL BEVERLEY, M.D.	1872—73
FREDERIC KITTON, Hon. F.R.M.S.	1873—74
H. D. GELDART	1874—75
JOHN B. BRIDGMAN	1875—76
T. G. BAYFIELD	1876—77
F. W. HARMER, F.G.S.	1877—78
" " "	1878—79
THOMAS SOUTHWELL, F.Z.S.	1879—80
OCTAVIUS CORDER	1880—81
J. H. GURNEY, Jun., F.Z.S.	1881—82
H. D. GELDART	1882—83
H. M. UPCHER, F.Z.S.	1883—84
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J. H. GURNEY, F.L.S., F.Z.S.	1898—99
JOHN T. HOTBLACK	1899—1900
SIDNEY F. HARMER, Sc.D., F.R.S.	1900—01
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HENRY WOODWARD, LL.D., F.R.S., V.P.Z.S., F.G.S.	1902—03
FREDERICK LONG, L.R.C.P.	1903—04
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J. H. F. WALTER, F.Z.S.	1914—15
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EDWARD BIDWELL	1918—19
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B. B. RIVIERE, F.R.C.S., M.B.O.U.	1920—21
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DONALD HUTCHINSON, M.D.	1924—25
E. H. HANKIN, M.A., Sc.D.	1925—26
" " "	1926—27
H. J. HOWARD, F.L.S.	1927—28
H. F. WITHERBY, F.Z.S., M.B.O.U.	1928—29
G. H. GURNEY, F.E.S., F.Z.S., M.B.O.U.	1929—30
MISS A. M. GELDART	1930—31
E. J. SALISBURY, D.Sc., F.L.S.	1931—32
MAJOR A. BUXTON, D.S.O., M.B.O.U.	1932—33
" " "	1933—34
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COLIN McLEAN	1935—36
G. J. COOKE	1936—37
MISS J. M. FERRIER, F.Z.S., M.B.O.U.	1937—38
E. T. BOARDMAN	1938—39
HUGH WORMALD, M.B.O.U.	1939—40
J. A. STEERS, M.A.	1940—41
E. C. KEITH	1941—42
A. J. RUDD	1942—43
MISS C. E. GAY	1943—44
SIR H. E. S. UPCHER	1944—45
H. W. BACK	1945—46
R. G. BUXTON	1946—47
THE EARL OF LEICESTER	1947—48

TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

FOR THE YEAR

1947

VOL. XVI PART IV.

EDITED BY MAJOR A. BUXTON

NORWICH

PRINTED BY THE SOMAN-WHERRY PRESS LTD., NORWICH.

FEBRUARY, 1948

Norfolk and Norwich Naturalists' Society

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H.M. THE KING

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THE RT. HON. THE EARL OF LEICESTER

President-elect

R. PEARCE GOULD

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E. T. DANIELS
R. A. RICHARDSON

NEW MEMBERS, CHANGES OF ADDRESS, etc.

MEMBERS ELECTED IN 1947.

Adcock, Miss G. E., 118, St. Clement's Hill, Norwich.
Alimonda, L. A., 28, Sunnyside Gardens, Upminster, Essex.
Allen, Capt. Graham, Sheringham House, Holt, Norfolk.
Andrew, E. S., 59, The Avenue, Lowestoft, Suffolk.
Benn, Miss, The Castle Museum, Norwich.
Birkbeck, H., Westacre Priory, King's Lynn.
Bitton, E. Q., Church Farm, Runhall, Norwich.
Bradshaw, Anthony, Jesus College, Cambridge.
Bryan, Mrs. H., Lanthwaite, Eaton, Norwich.
Buttery, Miss E. M., The Training College, Norwich.
Buxton, Hugh, Cowans, Thetford, Norfolk.
de Hamel, Major, White House, Trimingham, Norfolk.
de Hamel, Mrs., White House, Trimingham, Norfolk.
Doar, Rev. F. W., 410, Unthank Road, Norwich.
Fowler, Eric, c/o The Norfolk News Co. Ltd., 57, London Street, Norwich.
Gibson, Colin, Keys Hill, Wroxham, Norwich.
Gibson, Mrs. Colin, Keys Hill, Wroxham, Norwich.
Gilbert, Miss B. F., Deva House, Olney Road, Dereham, Norfolk.
Goom, Miss E. M., Winsford Hall Cottages, Stokesby, Gt. Yarmouth.
Harrison, J. C., Haynford, Norwich.
Howard, Miss, 27, Surrey Street, Norwich.
Hurrell, A. G., 88, Gordon Avenue, Thorpe, Norwich.
Larwood, G., 376, Bowthorpe Road, Norwich.
Layton, D. A., Tudor House, Poplar Avenue, Eaton, Norwich.
Lindqvist, Kjell, Drayton, Norwich.
Manning, S. A., 4, Patteson Road, Norwich.
Maynard, Mrs., 48, Clarendon Road, Norwich.
Myres, M. T., The Manor House, Kennington, Oxford.
Sistern, R. P., 17, St. Alban's Road, Norwich.
Smith, Dennis H., Tharston, Long Stratton, Norfolk.
Steward, Donald, The Grange, New Buckenham, Norfolk.
Tinsley, T. W., Stracey House, Stracey Road, Norwich.
Tusting, Miss J. M., Home Close, Cringleford, Norwich.
Warburg, J. W., The Old Rectory, Edingthorpe, North Walsham, Norfolk.
Watson, C. H., Quartley House, Holt, Norfolk.
Watt, K., Burnley Hall, East Somerton, Gt. Yarmouth.
Watt, Mrs., Burnley Hall, East Somerton, Gt. Yarmouth.
Whittaker, Dr., 24, The Close, Norwich.
Wiles, Miss Wenda P., Brook House, Stratton Strawless, Norwich.
Winsworth, John, 64, Cardiff Road, Norwich.
Wright, F. J., 10, Bush Road, Upper Hellesdon, Norwich.

CHANGES OF ADDRESS.

Barclay, Col. P., c/o Barclay's Bank, 54, Lombard Street, E.C. 3.
Barry, Miss E., Benskins, Westfield, Battle, Sussex.
Boardman, H. C., Ranworth Hall, Norwich.
Camm, G., 14, Geoffrey Road, Lakenham, Norwich.
Corfe, Miss I. W., 106, Norwich Road, North Walsham, Norfolk.
Ellis, M. B., Commonwealth Mycological Institute, Ferry Lane, Kew, Surrey.
Gay, Miss C. E., Little Toft, Stoke Holy Cross, Norwich.
Gosling, Mrs., Seamere, Hingham, Norfolk.
Hudd, Miss W. F., Surlingham, Norwich.
Hutchings, G. E., Juniper Hall, Mickleham, Surrey.
Johnson, A. E., Bay Farm, Hickling, Norwich.
Johnston, Mrs. (née Hulse), Lagley, Berkhamsted, Herts.
Long, G. S. B., 18, The Crescent, Chapel Field Road, Norwich.
Lowth, Miss, Little Toft, Stoke Holy Cross, Norwich.
Mann, Mrs. (née Long), 23, Church Street, Boston, Lincs.
Minns, Mrs. E., Pike House, Gong Hill, Farnham, Surrey.
Paulson, C. W. G., Wyresdale House, Pendleton Road, Redhill, Surrey.
Seago, M. J., 37, West Road, Caister, Gt. Yarmouth.
Silverwood, J. H., 50, Bracondale, Norwich.
Taylor, James, Lower Hilcot, Withington, Gloucestershire.
Thouless, Miss M. H., Apple Acre, Mill Road, Hethersett, Norwich.
Tydeman, Miss M., Coddenham, Ipswich.
Wheeler, Eng.-Capt. S. G., R.N., The Pheasantries, Edingthorpe, North Walsham.
Whittaker, S., 333, Norman Road, Derby.

MEMBERS LOST BY DEATH IN 1947.

Miss H. C. Colman, Mr. F. C. Hinde, Mr. Philip Norgate, Dr. F. Preston.

NORFOLK AND NORWICH NATURALISTS SOCIETY, 1946-1947.

Income and Expenditure Account for the year ended 31st, 1947.

1947.	Expenditure.	£ s. d.	£ s. d.	1947.	Income.	£ s. d.	£ s. d.
March 31	To Cost of Transactions	154 17 6		March 31	By Subscriptions	119 1 6	
	less Refund on Illustrations ...	36 7 6			,, Sale of Publications	1 17 6	
			118 10 0				120 19 0
	,, General Expenses						
	Postage, Stationery, Printing ...	23 10 10					
	Library Rent	6 5 0			,, Interest and Dividends received ...		17 18 9
	Advertising	3 0 0					
	Lecture Hall and Lecturers Fees ...	27 15 0					
	Subscriptions to Scientific Societies	1 2 6					
	Sundries	3 16 6			,, Excess of Expenditure over Income for the year		45 2 1
			65 9 10				
			£183 19 10				£183 19 10

BALANCE SHEET as at 31st March, 1947.

Liabilities.	£ s. d.	£ s. d.	Assets.	£ s. d.	£ s. d.
Accumulated Funds, 31st. March, 1946 ...	776 13 4		Subscriptions due		59 0 0
less Excess of Expenditure over Income for the year	45 2 1		Investments		484 0 0
		731 11 3	East Anglian Trustee Savings Bank ...		237 13 11
Subscriptions in Advance		9 0 0	Cash at Barclays Bank		116 3 4
Sundry Creditors		156 11 6	Cash in hand		5 6
		£897 2 9			£897 2 9

I have audited the above Accounts and find them correct.

C. R. A. HAMMOMD,
Hon. Auditor.
25th October, 1947.

At a meeting of the Committee on 8th October, 1947, it was resolved that the accounts of the Society should be presented in the revised form shown above. These figures incorporate those shown in the accounts placed before the members at the Annual General Meeting.

D. A. PEARCE GOULD,
Hon. Treasurer.

I

HON. SECRETARY'S REPORT

During 1946-47 meetings were held at Norwich Castle Museum as follows :—November 12, 1946 : exhibition of specimens. December 10, 1946 : lantern lecture " Genetics and the Naturalist " by Mr. R. S. Jones, B.Sc. January 25, 1947 : joint meeting with the British Trust for Ornithology ; Mr. R. S. Fitter described the work undertaken by the Trust in recent years and referred to co-operative methods of collecting statistics on various ornithological problems. February 25 : lantern lecture " Seals and Sea-birds " by Mr. Seton Gordon ; Mr. Gordon gave a further talk on " The Golden Eagle " at the Stuart Hall, Norwich, on March 1. The Annual Meeting was held at the Castle Museum on May 3, when Mr. R. G. Buxton, the retiring president, delivered an address on " The effects of the abnormal weather of 1946-47 on wild life in Norfolk." Officers were elected to serve in 1946-47 as follows :—President, The Rt. Hon. The Earl of Leicester ; President-elect, Mr. R. Pearce Gould ; Hon. Auditor, Mr. C. R. A. Hammond ; Hon. Treasurer, Mr. D. A. P. Gould ; Hon. Secretary, Mr. H. W. Back ; Committee, Messrs. J. W. Mills, R. A. Richardson and G. F. B. Robinson, to serve for three years in the places of members retiring by rotation. The retiring Hon. Treasurer, Mr. Robinson, was thanked for his services to the Society.

Excursions were held during the summer of 1947 as follows :—

July 6 : Barton and Alderfen Broads (leader, Mr. J. W. Mills). August 2 : joint ramble with the Suffolk Naturalists' Society at Redgrave Fen ; members were afterwards entertained to tea by Mr. C. C. Tyrrel Giles at Hopton. September 7 : a walking excursion in Breckland was planned, but abandoned through lack of support ; a few members visited the East Wretham area by car. September 25 : Wheatfen Broad and Surlingham Wood, by invitation of Mr. and Mrs. E. A. Ellis. A large party of members of the Bedfordshire Natural History Society and Field Club made an all-day excursion to Wheatfen, Alderfen and Hickling Broads on June 1, and were welcomed by representatives of this Society.

II

THE JUNIOR BRANCH OF THE NORFOLK AND NORWICH NATURALISTS' SOCIETY.

Annual Report, 1947.

The Junior Branch is primarily intended for those young people who being at school or College are unable to attend the meetings of the Senior Society, but others interested up to and including College age are eligible.

The Annual Subscription is 2s. 6d., payable in the January of each year.

The present membership numbers 99.

The following excursions were held :—

January 9th., 1947.—An interesting Meeting was held at Surlingham Wood and Wheatfen by invitation of Mr. and Mrs. Ellis, when 24 members explored the wood and marshes and went by boat over the Broad.

April 21st., 1947.—48 Members enjoyed an instructive day at Taverham Mill by invitation of Major and Mrs. Lloyd.

August 26th., 1947.—24 Members visited Scolt Head Island, accompanied by the watcher.

BALANCE SHEET for the year ending 30th September, 1946.

Receipts.	£	s.	d.	Payments.	£	s.	d.
Balance from 1945 Account ...	1	1	0	Typing Notices	3	3	0
81 Members' Subscriptions for 1947	10	2	6	Postages	1	18	0
				Stationery		10	4
5 Members' Subscriptions for 1948		12	6	Hire of Bus for Meetings ...	13	10	0
				Hire of Boats	3	0	0
Bus fares from Members ...	11	10	0	Balance in hand	1	4	8
	£23	6	0		£23	6	0

III

PRESIDENT'S ADDRESS

THE EFFECTS OF THE WEATHER ON WILD LIFE IN NORFOLK DURING 1946-47.

Presidential Address delivered by Capt. Richard G. Buxton to the Members of the Norfolk and Norwich Naturalists Society at Castle Museum, Norwich, on May 3rd, 1947.

DURING the past year we have experienced extraordinary weather and I am talking to you today about the storms and bitter winter, and particularly about the effects of the weather on Wild Life in Norfolk.

The heaviest hailstorms ever recorded in Norfolk in July were followed by a very wet August and the coldest winter for fifty years. I am afraid the birds in the country have suffered very severely. The first thunderstorm occurred on July 2nd accompanied by terrific hail; starting in the fens, it crossed Norfolk leaving devastation behind it. I was at Wiveton and in twenty minutes the hail was five to six inches deep on my lawn. I weighed three samples of ten stones and each weighed about four ounces. Damage to fruit was very serious and the entire crop of peaches, apricots and plums on South walls were so badly bruised that they rotted before they were ripe. Five acres of Cox's Orange Pippin apples were badly damaged, branches were broken and half the apples split or knocked off. The remainder, though blemished, healed up and kept well in spite of the damage done to them.

All young pheasants and partridges in exposed places were killed and a covey of quail, which hatched on Cley Hall Farm and were seen by W. Bishop—the watcher at Cley— on June 15th, were never seen or heard of again after the hailstorm. At Westacre where the storm was heaviest, old pheasants and partridges were killed, an old pheasant being found with its skull split open. Many partridges were stunned and were picked up after the storm and even on the following day. There were two more heavy hailstorms during the month, one in the Wroxham neighbourhood accompanied by a hurricane of wind which did much damage.

August was a very wet month resulting in great difficulties over the harvest, many fields being flooded and a lot of barley shelling out. This provided much feed for duck and there were large quantities of wild fowl on the Broads all the winter. In the second week of February great flocks of duck were seen on Egmere Farm near Holkham scraping through the snow to get at the waste barley below. More mallard than usual bred on Cley marshes and there were from eight hundred to one thousand there at the beginning of August, but they had nearly all gone inland by the middle of the month ; nor did foreign duck remain on the coast, probably because there was good feeding inland. Moreover in the Cley area there were continuous explosions of mines which were being cleared on Salthouse Beach. About four thousand mines had been laid on the beach between Cley and Weybourne in 1940. The gales and floods have washed the shingle back a distance of fifty feet in places so that great difficulty has been experienced in clearing the mines and the work and explosions still go on daily when the weather is suitable. The result is great disturbance of all bird life.

In November there was a large migration of waxwings and many were reported in Norfolk throughout the winter. A flock arrived in the garden round Norwich Castle on January 20th and Mr. Rose saw one at Wimbledon on April 3rd, the last to be reported. On November 9th Bishop and I saw two bearded tits on Cley marsh, the first to be seen there for thirty years. They remained in the reed beds and three were frequently seen until the snow storms in February, when they no doubt perished. This is very disappointing as they used to breed at Cley, the last nest to be found being in 1917. The only live bearded tit that I have heard of since the frost was a single cock at Thorpeness. The bird was calling excitedly but no hen was seen. Many Bewick and whooper swans were reported on the Norfolk Coast. On January 18th Captain Lance and I were on Cley marsh when two whooper swans, intending to alight, flew within twenty yards of us before they saw us and turned away—a fine sight with the evening sun on them.

The big frost started on January 21st and on January 26th Bishop saw about one hundred shorelacks and two to three

hundred snow buntings near the beach. There was a blizzard all day on the 28th and the marsh froze up. There were two or three hundred brent geese on Salthouse. On February 1st I flushed seventeen woodcock at Wiveton while walking round my property. Two geese, I think bean geese, flew low over my garden at midday and lit in the River Glaven by the main road into Cley. Whoopers were also seen there the following week. A buzzard on an elm tree in front of my house was being mobbed by blackbirds. From 3rd to the 6th February there were continuous easterly gales and blizzards. Motoring from Stanhoe to Creake on February 6th I saw a great spotted woodpecker on a telegraph pole; it was looking in vain for its food a mile away from the nearest woods. During this period all roads and railways were blocked by snowdrifts. Blakeney harbour was full of wild fowl and there were flocks of Bewick and whooper swans and many brent geese. On February 8th twenty to thirty Bewick swans were feeding in the main drain at Cley and on the 13th Bishop saw five smew feeding with tufted and scaup in the same place. On February 15th I found several dead thrushes and a missel thrush in my garden and nine dead water hens in a ditch close together and the small birds suffered severely.

There were about two hundred water hens in an osier carr behind my cowhouse before the frost and they all died in spite of the fact that it contained an open ditch with watercress and other weeds. Near a manure heap, which was added to daily, and by the overflow from the cowhouse drain I picked up several waterhens sitting in snow paralysed with cold. Hundreds also died on Cley marsh and Bishop saw two otters collecting dead waterhens and burying them under dry grass and rushes. I tracked otters up to my kitchen garden and behind my cowhouse, no doubt after dead waterhens which were all removed; an otter regularly crossed the main road near the sluice, where there were always fresh tracks. On February 16th I found a woodcock unable to fly—I put it in my greenhouse and with great difficulty procured worms for it to eat, but it died the next day. Colonel Portal found three woodcock dead in a garden at Blakeney the following day. Another was seen feeding on a hot bed under a frame of lettuces in my garden.

On February 19th Bishop saw five harlequin duck resting on the ice in the main drain at Cley three drakes in full plumage and two ducks—a magnificent sight at twenty-five yards. There were large ice floes a mile or two long off the Norfolk Coast at this time. The harlequins flew off to sea when disturbed and passed near a gunner on the beach who said they were strange duck he had never seen before. Bishop spent a long period in Iceland during the war where harlequin duck are common so that he knows them well. Another was seen by Captain Bagnall-Oakley on February 24th in Cley channel. On March 9th I saw a solitary duck in the fresh water drain at Cley near Bishop's cottage. It was not a bird that I had ever seen before and I have since examined specimens at the Natural History Museum. : even so I cannot definitely identify it. It was either a female harlequin or immature female scaup—the markings are very similar and I did not notice the size of its bill ; Mr. Eals of Morston tells me that he saw half a dozen strange duck which he could not identify about March 2nd in Blakeney harbour with a bunch of wigeon—three or four were very black and he is now confident that they were harlequins. He told me that there were more duck in Blakeney harbour at the end of February than he has ever seen before and Major Philip Hamond confirms this.

On February 22nd there was very heavy snow which lay eighteen inches deep on a sheltered lawn. I went into the butcher's shop at Cley, where I saw hanging up longtailed duck, velvet scoter, merganser, scaup, shellduck, mallard, etc. There was an open patch of water on Cley marsh which never froze up where bitterns were always to be seen. On March 2nd Bishop found a dead one and another on March 11th. He heard the first bittern booming on March 22nd. I am afraid that the bitterns at Cley have suffered severely. There were four or five nests there last year and only two for certain this year.

Early in March I was staying at Barwick where a strange bird had been found in a field of kale. This was a great crested grebe, which no doubt thought that the kale was water in the deep snow. There is no running water within miles, and I therefore brought it back to Wiveton—a twenty mile drive direct, but had to drive over seventy miles to avoid blocked roads. I put the grebe into the open ditch near my house and

it was alive the next morning, but I found it dead one hundred yards away in the afternoon ; it had climbed on to the ice and had been frozen.

There was tremendous mortality among blackbirds, thrushes and small birds ; very few survived in my garden. Colonel Quintin Gurney tells me that he picked up two green woodpeckers dead in the snow and has seen none since ; I have seen none alive at Wiveton. He also tells me that in his rookery twenty-five per cent. of the nests were blown down in the April gales, and that many other rookeries had suffered. As a rule we have many woodcock at Wiveton in March on migration but I have not seen one this year nor has anybody else that I have met : neither have I seen the usual flocks of fieldfares and redwings going north.

I have read the transactions of the Society for 1890-91 containing an account by Mr. Southwell of the very severe frost which lasted from November 25th, 1890 to January 22nd, 1891 —a period of 59 days. The frost appears to have been quite as severe as that experienced last winter, but without such heavy snow and no mention is made of snowdrifts which have been so serious on this occasion. Mr. Southwell reported great mortality among kingfishers, herons, bitterns, thrushes and gulls in 1890. Mr. Kinnear told me that the same thing happened this year to gulls in the north of England, but Bishop stated that he had seen no signs that gulls suffered at Cley. Mr. Southwell states that swans, bean geese and brent geese were numerous on the marshes and that there were unusual numbers of smew. I was very interested to read in this volume the account of a flock of seven great bustards which visited England during the winter ; one was picked up dead at Stiffkey on 19th January, 1891 and another was killed at Mildenhall on February 5th.

It is too early to say what permanent damage has been done to trees and shrubs by the frost at Wiveton. Damage was done by a south-west wind with a very sharp frost early in March, and a number of insignis firs are badly cut on the south side and many shrubs look as if they have been killed— myrtle pittospernum, etc.—but my gardener thinks they may recover. Rabbits did much harm by barking apple trees since snow drifts were four or five feet deep and they stripped

the branches; no wire netting could prevent this. In most cases the inner bark was left and I hope that the trees may recover. In any case they are all in bud now.

Note.

(All these trees have recovered in spite of the very dry summer. The five acre orchard of Cox's Orange Pippins which was badly damaged by rabbits has produced fifteen tons of apples this year. R.G.B., October 24th, 1947.)

Mr. John H. Willis has kindly allowed me to include his account of the weather in January, February and March, 1947 as a permanent record of this extraordinary winter.

THE WEATHER OF JANUARY, 1947.

By John H. Willis.

Following a chilly December came, unfortunately, yet a chillier January. One wavelet of warmth crossed the middle of the month, to lift temperatures between the 11th and the 19th to the forties and on three days to the fifties, reaching on the 16th the high January reading of fifty-five degrees. But both the beginning and the end of the month were abnormally cold. Its opening spell took largely the form of keen easterly wind coursing through the bright sunny days, when the sun was too little above the horizon to yield much warmth.

The first snow of the year did not appear till the 11th and 12th —a brief dress rehearsal for the hard wintry weather soon to follow. It set in on the 19th as the wind swung from the south west to north-east; and from then for the remainder of the month we had hard wintry weather, when the ground was swept with snow and our usual visitors in hard weather, the gulls, were about in the bleak wintry skies. As the snowfalls at first were not deep, while frosts were severe, soil temperature fell to unusually low levels, bringing vegetation practically to a standstill. On the 25th the thermometer fell to 7.7 or 24.3 degrees of frost; the sharpest frost for six years. From the 26th, when the worst of the cold spell swept by, the thermometer remained below freezing point for 138 hours in succession, and though locally we largely escaped the deep snows and drifts that brought isolation and road blocks elsewhere, the

month's total falls reached some 6 to 7 inches locally. Yet although the mean temperature of the month was 4 degrees below normal, its early sprinkling of bright days made it the sunniest January save one on my records ; only January, 1940 surpassed it with 4.2 hours of sunshine more.

THE WEATHER OF FEBRUARY, 1947.

The wave of cold that swept over the country from the third week of January remained through February in full tide. Though other hard winters, with their interludes of mild days, may claim longer span, 1947's biting weather maintained its prolonged run practically unrelieved. So overcast indeed was February from its entry that we seemed to be travelling through the month in wintry twilight: on three days only in its first three weeks did gleams of sun edge dimly through the clouds. To the half foot of snow already on the ground at its entry, February swiftly added such smothering falls as kept the earth buried the entire remainder of the month. Of its two and a half feet of snowfall, upwards of a foot fell on the 10th. Unfortunately immediately in the wake of its heaviest falls came such a run of cold that for a fortnight, or 333 hours on end, the thermometer kept below freezing point. Thus, in the persisting north-easterly winds that rose at times to gale force, clouds of powdery snow were soon rising in blizzards from the snowfields, to block for the best part of a fortnight many highroads and railways in East Anglia with their drifts. And again, as in February 1940, the prolonged run of cold brought an added Arctic touch with the appearance of icefloes in our seas.

In the month's closing period, it is true, some rents in the clouds brought broad patches of sunshine. They brought, also, however, intense radiation at night and temperatures on the 24th and 25th sank in places below zero, the reading of 0.1 at my station on the 25th being the lowest for thirty-five years. Thus in summary the month proved, by the narrow margin of six minutes, the most sunless month on my records, and the coldest, eclipsing the previous record holder, February 1929, by as much as 2.7 degrees.

THE WEATHER OF MARCH, 1947.

The memorable cold that invaded the country in January still persisted unbroken at the entry of March. To the deep snows already on the ground the first week of March added further hampering falls of nearly 12 inches in depth. Its frosts too were among the severest of the entire winter, reaching twenty degrees on the 7th and nearly 30 on the 3rd. However, in the following eight days came the first signs of the waning of winter at last, with periods of cold grudging thaw. From the 8th to the 15th sleet and chill rain was beginning to mingle with the snow ; and deep depressions between the 9th and 15th added, most unfortunately, two and a quarter inches of moisture. As the snow was sufficiently deep to absorb the bulk of it, the fast rise of warmth around the 16th, that raised the temperature some twenty degrees in two days, released with the thawing of the snow the bulk of two months of snowfall and rain in forty-eight hours—the cause of the unparalleled floods that soon began turning wide areas of fenland and elsewhere into inland seas. Unfortunately, with the passing of the cold, as was also the case in 1881 and 1895, came a gale of outstanding violence to add to the desolation of the floods.

The skies on most days were largely overcast and seven days only escaped snow or rain, so that it proved also the wettest March on record. Although temperatures in the latter part of the month rose mainly to the fifties, the mean temperature of both soil and oil, was, far below normal. The season is accordingly phenomenally late ; and for once no daffodils have appeared in flower to greet the winds of March.

IV

SOME VEGETATIONAL CHANGES ON A SHINGLE OFF-SHORE BAR AT THORNHAM.

By V. J. Chapman

(Professor of Botany, University College, Auckland, N.Z.)

In 1935 the present author in conjunction with Mr. J. A. Steers, began what was intended to be a series of long term observations on a relatively new off-shore bar of shingle at Thornham (cf. Trans., 1937). These off-shore bars originate on the sand flats between Hunstanton and Blakeney, but many of them are probably only ephemeral and disappear either rapidly or else after some vicissitudes. Others however are more permanent and grow in length and height and sooner or later embryo dunes form on them. Ultimately they may achieve the size of a structure such as Scolt Head Island.

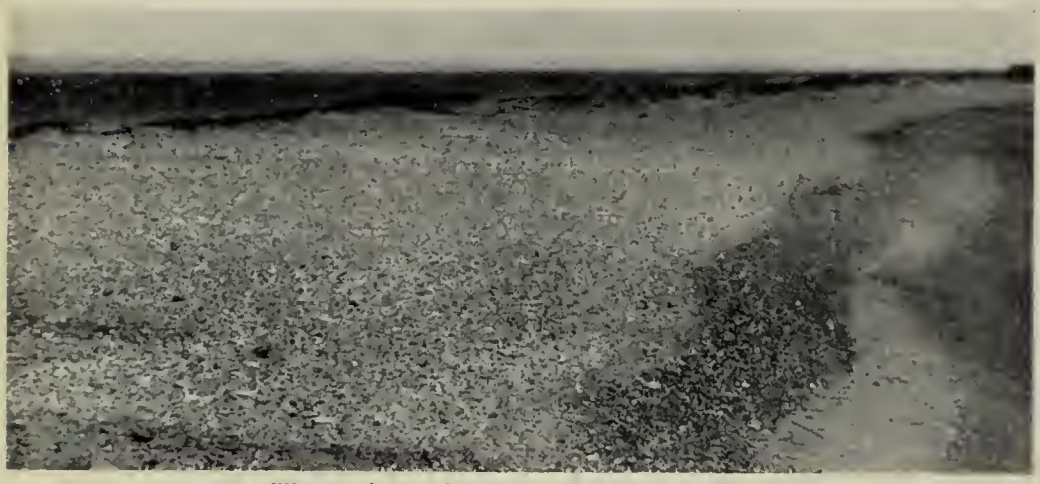
On the beach at Thornham in front of the salt marshes there are one or two of these embryonic off-shore bars and one of these in particular was selected for study. It is not proposed to describe the physiographic changes as these have been described elsewhere (Trans., 1937). It was not intended that an account of the vegetation changes should be published at this early stage, but as the present author has now left England it seems appropriate to put the data on record in the hope that someone else will be able to continue the observations.

The first vegetation map was made in 1935 and another one in 1937. An opportunity also occurred during the war to produce a third map in 1941. These three maps are illustrated in figs 1—3, and a few brief observations can be made concerning them.

In 1935 there was a well established dune system at each end of the bar with some developing embryo dunes in the centre portion, which was lower in relation to sea level. There was a well-marked drift line at the eastern end, but several species that occurred were ephemeral in character as they were absent in succeeding years, e.g., *Aster tripolium*, *Polygonum aviculare* (present again in 1941), *Atriplex patula* forma *hastata* and

PLATE I

Salicornia herbacea agg. colonising the sand flat on the landward side of the island, 1937.



PLA II

1937. The embryo dunes on the centre of the island.

PLATE III

1937. Marsh of Suaeda maritima var. macrocarpa between hook and main ridge.

Chenopodium rubrum. There was no real evidence of marsh development on the landward side of the bar, though there were scattered plants of *Salicornia herbacea* (*S. europaea*) agg. In 1937 the eastern drift line was absent and a new hook had appeared which already bore quite a pronounced vegetation, including *Elymus arenarius*, and *Psamma arenaria*. The eastern dune system had also become more extensive and there had been a distinct spread of *Elymus arenarius* in this region. The central embryo dunes also showed more development (Plate II). On the western dune some changes had taken place and there was an increase in both *Psamma* and *Elymus* whilst the small area between the little hook and the main ridge was thickly clothed with *Suaeda maritima* var *macrocarpa* (Plate III.) This variety is commonly associated with areas such as this where there is a high proportion of sand in the soil. It was also evident that a salt marsh was in process of development on the landward side of the bar where there was a wide distribution of *Salicornia herbacea ag* (Plate 1).

Between 1937 and 1941 a severe winter storm had brought about considerable erosion along the coast and the island at Thornham did not escape. The 1941 map shows that the eastern dune area had been completely severed in two and that the central embryo dunes had been completely washed away and the bar lowered to such an extent that new embryo dunes had not been able to form. It will be noticed that the incipient marsh no longer existed on the landward side and its disappearance might have been due to one of two causes :—

(*a*) failure of the preceeding *Salicornia* crop to set seed : this seems unlikely.

(*b*) the lowering of the central part of the bar allowed the sea more frequent access to the landward side and the seeds of *Salicornia* were washed shorewards so that it was not possible for a *Salicornia* marsh to continue developing. When the island was too high for the sea to wash over it the water had to come round each side and the seeds of *Salicornia* were washed up into the bay, whilst the water also would be relatively quiescent so that young seedlings would not be subjected to violent mechanical action (Wiene, 1935). If the bar ever becomes high enough again it is likely that salt marsh will again develop behind it.

In conclusion it is worth recording that in 1937 there was a second bar to the west of the island described above. This was in a much younger stage of development and merely bore five clumps of *Agropyron junceum*. In 1941 these had increased in number to twenty patches and in addition there were two plants of *Salsola Kali* and one of *Arenaria peploides*. Since then it is possible that this Thornham Far West Island has disappeared.

Steers, J. A., 1937.—Scolt Head Island Report. *Trans. Norf. and Norw. Nat. Soc., Vol. XIV, page* 210.

Wiene, P. O., 1935.—A quantitative study of the influence of tides upon populations of *Salicornia europaea*. *Journ. Ecology* 23, 323.

Ar	Arenaria peploides
L	Elymus arenarius
E	Eryngium maritimum
O	Otione portulacoides
C	Cahile maritima
S	Salicornia herbacea
Sk	Salsola kali
Fa	Festuca arenaria
Sf	Suaeda maritima f. flexilis
As	Aster tripolium
Pa	Polygonum aviculare
Pc	Atriplex patula
Al	Atriplex littoralis
Cr	Chenopodium rubram
Sp	Salicornia perennis
R	Rumex trigranulatus
Sm	Suaeda maritima f. macrocarpa
Smp	Suaeda maritima agg.

Fig. 1. Vegetation Map of Thornham Island in 1937.

Dune

Dune and Agropyron junceum

A	Agropyron junceum
M	Psamma arenaria
Ar	Arenaria peploides
L	Elymus arenarius
E	Eryngium maritimum
O	Obione portulacoides
C	Cahile maritima
S	Salicornia herbacea
Sk	Salsola kali
Fa	Festuca arenaria
Sf	Suaeda maritima f. flexilis
As	Aster tripolium
Pa	Polygonum aviculare
Pc	Atriplex patula
Al	Atriplex littoralis
Cr	Chenopodium rubrum
Sp	Salicornia pereunis
R	Rumex trigranulatus
Sm	Suaeda maritima f. macrocarpa
Smp	Suaeda maritima agg.

Fig. 3. Vegetation Map of Thornham Island in 1941.

V

ACCRETION ON SCOLT HEAD ISLAND MARSHES.

By J. A. Steers.

In Transactions (Vol. XV, 1939, p. 41) I published a note, illustrated with maps and diagrams, of the rate of sedimentation on some of the marshes on Scolt Head Island. Those records covered four years. This summer (June, 1947) I was able to measure the accretion again, and the figures given below cover 141 months, or approximately 12 years. The short discussion in the 1939 note is still adequate, and the views there given for varying rates and other factors are all supported by the longer series of observations.

In the following tables the station numbers are the same as in the diagrams illustrating the 1939 note.

1. Golf Links Marsh.

Station.	Amount of Accretion in 141 months.
1	5.0 cm.
2	9.5 ,,
3	11.0 ,,
4	5.7 ,,
5	5.3 ,,
6	6.0 ,,
7	4.0 ,,
8	4.7 ,,

2. Upper Hut Marsh.

Station.	Amount of Accretion in 141 months.
1	2.4 cm.
2	lost
3	2.0 cm.
4	1.4 ,,
5	1.2 ,,
6	1.5 ,,
7	2.5 ,,
8	1.0 ,,
9	1.7 ..
10	3.5 ,,
11	4.0 ,,
12	6.0 ,,
13	lost
14	lost
15	6.8 cm.
16	lost
17	lost
18	3.8 cm.
19	No record
20	1.5 cm.
21	No record

3. Lower Hut Marsh.

Station.	Amount of Accretion in 141 months.
1	6.5 cm.
2	7.5 ,,
3	8.0 ,,
4	7.0 ,,
5	8.7 ,,
6	Eroded away
7	7.0 cm.
8	7.6 ,,
9	8.5 ,,
10	8.4 ,,
11	8.0 ,,
12	6.4 ,,
13	6.5 ,,
14	9.0 ,,
15	7.4 ,,
16	7.3 ,,
17	6.5 ,,
18	8.8 ,,
19	9.0 ,,
20	5.8 ,,
21	6.0 ,,
22	8.5 ,,
23	Eroded away

4. Missel Marsh.

Station.	Amount of Accretion in 141 months.
1	lost
2	8.5 cm.
3	7.5 ,,
4	12.5 ,,
5	10.8 ,,
6	9.0 ,,
7	9.4 ,,
8	10.6 ,,
9	9.4 ,,
10	14.0 ,,
11	lost
12	10.0 cm.
13	lost
14	10.0 cm.
15	10.0 ,,
16	11.3 ,,
17	11.5 ,,
18	10.0 ,,
19	9.0 ,,
20	11.0 ,,
21	10.5 ,,
22	10.5 ,,
23	11.5 ,,
24	11.5 ,,
25	11.0 ,,
26	9.8 ,,
27	10.0 ,,
28	12.0 ,,
29	11.0 ,,
30	12.0 ,,
31	11.0 ,,
32	10 5 ,,
33	11.5 ,,
34	12.5 ,,
35	10.5 ,,
36	lost
37	lost

5. ASTER MARSH.

This marsh—and the line of stations—has been considerably disturbed by shell fire. For this reason records are only available for some of the stations.

SUBSIDIARY LINE.

1d, 1c, 1b, 1a, 1. No records : all destroyed.

MAIN LINE.

Station.	Amount of Accretion in 141 months.
2a	—
1	—
2	—
3	—
4	3.9 cm.
5	2.7 ,,
6	2.7 ,,
7	5.8 ,,
8	6.1 ,,
9	5.2 ,,
10	10.4 ,,

The average rates of sedimentation along each line for the 45 months ending 1939, and for the 141 months ending 1947 are :—

	1939.	1947.	
Missel Marsh ...	c. 3.33 cm.	10.6 cm.	3.38 cm.
Lower Hut Marsh ...	2.67 ,,	7.5 ,,	2.39 ,,
Golf Links Marsh ...	2.16 ,,	6.40 ,,	2.04 ,,
Upper Hut Marsh ...	0.81 ,,	2.80 ,,	0.90 ,,
Aster Marsh (Long Line)	1.74 ,,	5.25 ,, (for seven stations).	1.67 ,,

The 1939 and 1947 figures agree very well : if we divide the 1947 figures by 3.13 we have a direct relationship with the 1939 figures. The results are given in the last column, and they are satisfactory in that they seem to substantiate the reasoning for the differing rates of sedimentation outlined in 1939.

BLAKENEY POINT — SEPTEMBER 1946. *New detail mapped by C. Armour, B.A. and A.J. Lee. Additional detail added in July, 1947 by R.F. Peel and A.T. Grove.*

Shingle-Ridges — *Flat Shingle* — *Sand* — *Incipient Dunes* — *Dunes* — *Dune Blow-Outs* — *Salicornia-Aster Marsh* S.A.M. *Saltings*

VI

NOTE ON THE NEW MAP OF BLAKENEY POINT.

By J. A. Steers.

The existing maps of Blakeney Point were all out of date, and there was not one that was a physiographical map in the full sense of the word. In 1946 the National Trust very kindly made a grant of expenses which enabled two of my geographers, Mr. Armour and Mr. Lee to re-map the Point. The new map shows a great deal of detail, and the North Side was completely surveyed. South Side is largely taken from the Ordnance map, except that the Morston raised beach is marked. In 1947 Mr. Peel (who mapped Scolt Head Island) and Mr. Grove spent a day or two on the Point and added new detail of shingle ridges on the main beach and headland. Comparatively rapid and interesting changes are in progress there, and the new map will prove a useful base from which to measure further developments.

VII

WILD BIRD PROTECTION IN NORFOLK IN 1947

Report of the Council

The Council of the Trust has much pleasure in presenting its annual report on the bird life of Norfolk for 1947.

In doing so it expresses its deep appreciation of the support given to the work of the Trust by members and subscribers, a number of whom have contributed to its funds for many years.

As the Trust continues to expand and to acquire new responsibilities its need for funds increases, and the Council will be grateful if members will be kind enough to circulate the report among friends likely to be interested with a view to making its activities more widely known.

The Council also tenders its thanks to Mr. Walter Higham, Dr. R. G. Carlson and Mr. S. C. Porter for the beautiful photographs which add so much interest to the report. They were all taken at Hickling.

The year 1947 will always be remembered as an outstanding one for the intensely cold long winter followed by an abnormally hot summer with drought which lasted well on into the autumn.

The effect of six weeks of unbroken frost and deep snow was disastrous for all the small resident birds and winter migrants as well as for kingfishers, bitterns, herons and the waders. In spite of the ideal breeding season many species are still lamentably scarce particularly the song thrush, wren, long-tailed tit, green woodpecker and kingfisher. The bearded tits in the Hickling area were decimated and it is feared that the Broadland race of this lovely little bird is doomed. News of one or two pairs which survived in Suffolk offers a ray of hope, but it is doubtful whether the stock is sufficient for the survival of the species in this area.

The following notes on the bird life of Scolt Head, Blakeney Point and Cley are extracted from the carefully kept diaries of the three keepers, Chestney, Eales and Bishop with one or two additions contributed by reliable visitors. Scolt

Copyright R. G. Carlson

Sedge-Warbler at Nest

Head and Blakeney Point are both National Trust properties to the upkeep of which the Norfolk Naturalists Trust contributes.

SCOLT HEAD ISLAND.

In contrast with the severe weather which began in the middle of the month, January opened with fair weather and light winds.

On the first day of the month large flocks of snow-buntings were seen on the Island and two parties of shore-larks, one of five and the other of nine birds.

On January 2nd two hen-harriers were hunting over the marshes and dunes ; also a merlin which was seen to take a linnet on the wing after a long chase.

Five short-eared owls were flushed from the dunes on January 6th which rather surprisingly flew off out to sea, the gulls harrying them as they went. Six were seen again on the 16th.

The cold weather was heralded by a big increase in the number of waders feeding on the mud-flats and also of Brent geese and ducks in the creek. These included numbers of wigeon, goldeneye, tufted, some smew and two long-tailed ducks. At the same time flocks of pigeons and large numbers of fieldfares and redwings were seen coming in from overseas.

The snow began to fall in the middle of the month and thereafter intermittently throughout February and the first week in March, with occasional blizzards and severe frost. So intense was the cold that the mud-flats and sand were frozen hard as soon as they were uncovered by the tide, and the small waders very soon became so starved and weak that they were easy prey for hungry grey crows and the large gulls. Numbers of great black-backs frequented the shore and on January 31st were joined by six glaucous gulls.

On February 1st the first dead birds, including a number of thrushes were picked up. By this time the Brent geese had cleaned up all the weed available in the harbour and at high tide were feeding right up by the Staithe. They also ate the grass on the marshes when the tide washed off the snow, but they gradually became in a very poor condition.

In spite of this they had little respite from gunners who could still get five shillings a head for birds which in normal times would have been quite unsaleable.

A party of twenty-two whooper swans were in the harbour on February 16th, and were sufficiently tame to allow a boat to be rowed within a short distance of them.

Waxwings were seen in the village on February 7th and again on March 2nd. One bird was feeding on the hips of a rose bush in Chestney's garden at Dial House.

In spite of the bitterly cold weather a large company of sheld-ducks were in Norton creek on February 6th. It might have been expected that in such conditions their return would have been delayed beyond the normal time.

Two common buzzards were seen in the wood behind Brancaster Staithe when Chestney was pigeon shooting on February 12th.

There was little bird-life on the Island at the end of February except for the snow-buntings, some of them very white birds, some skylarks and a large party of shore-larks, estimated at about fifty birds.

On March 5th there appeared to be an immigration of skylarks. A flock of some 500 birds was found sitting on the shore-line obviously very tired and weak, so much so that they did not fly off when Chestney walked past them but merely scattered on either side of him.

Velvet scoters were in the harbour with the Brent geese on March 5th ; and two were seen on the Beach Point on April 16th.

The thaw began very slowly on March 11th with higher day temperatures but hard frosts each night. At Dial House water was running in the pipes again for the first time for six weeks. After this Chestney was kept busy for some time with repairs to his house and buildings.

On March 12th a pair of ringed plovers on the island appeared to be courting.

Sheld-ducks were looking for suitable nesting sites all along the dune areas of the island on April 3rd.

On April 7th the first Sandwich terns were heard calling and were seen flying very high in an easterly direction. Several wheatears were passing through on the same day.

An exceptionally strong gale from the North on April 8th, coinciding with spring tides, did much damage to the ternery, washing away the western end and the dune area on it. The high seas washed up quantities of large mussels which attracted a great many gulls.

On April 10th ringed plovers were making scrapes all along the beaches. The first small migrants, swallows and whitethroats were seen.

Breeding Species.

Sandwich Tern ... A number arrived early in May but the weather was cold and they did not settle down. Some laid eggs but these were broken as is so often the case, and after two or three days the birds left. Later fifty pairs arrived, possibly from Cley where they had attempted to nest on the beach where German P.O.W. were clearing mines. These birds settled on the ridge near the Long Hills and young were hatched in thirty nests.

Common Tern ... A few arrived on April 16th. The first eggs were laid on May 20th and eventually there were about one thousand nests—rather less than last year. There was a very large mortality among the early hatched chicks but the later ones did well and a a large proportion of them flew.

Arctic Tern ... ... Three pairs were identified nesting among the common terns. In a large colony it is difficult to hear these birds calling among so many commons, and for this reason they are often overlooked.

Roseate Tern ...	...	A pair was seen and heard frequently throughout the breeding season but they did not settle down either here or on Blakeney Point where they were also seen from time to time. Only one pair has bred here for a number of years and the female, if the same bird, must be very old. There have never been more than two pairs. This season the Roseates behaved oddly and from time to time one would take the fish from common terns which were returning to their young. On one occasion a roseate was seen to take a whitebait from a common tern chick
Little Tern ...	...	The first arrivals were fishing in Norton Creek on April 15th. There were 184 nests, most of them on the beach near the ternery and forty-three at Smugglers' Gap. The first chicks hatched on June 12th and the majority of the young were successfully reared.
Ringed Plover	...	There were not so many breeding pairs as usual owing to the number lost during the severe winter. The first eggs were noted on May 1st and the first chicks hatched on the 20th. Thirty-nine nests were counted but no doubt there were more which were not found.
Oyster-catcher	...	These seem to increase each year. There were two or three nests on every shingle ridge and ninety-two were found.
Redshank ...	...	Nineteen nests were found but, judging from the number of young seen, there were probably several more which had escaped notice.

Sheld-duck ... ... These had an excellent breeding season. The first broods were in the creek on June 14th and later on there were numbers of them, mostly from nests on the Island but also some from the common behind the village.

The kittiwakes which nested last year did not return this season. There was a number of these gulls about throughout the summer. On June 21st a party of forty-one was resting on the ternery beach.

A pair of marsh-harriers frequented the Island and Brancaster golf course throughout the spring and summer and undoubtedly nested in the neighbourhood, probably on the Burnham marshes. On May 4th, Chestney approached within a reasonably short distance of the male bird sitting on a stump. On September 5th they were again seen in company with one young bird.

A bird of prey was responsible for killing a number of little and common terns which were found decapitated. The culprit was probably a merlin which was seen from time to time working along the dunes.

The dry summer resulted in numbers of rats on the Island in search of eggs to quench their thirst ; they became a pest on the ternery and proved very difficult to catch.

The Autumn migration this year was a dull one as is so often the case in such fine still weather. The movement of green plovers began on June 30th when they were passing through all day from east to west. The next day, July 1st a similar movement of swifts and swallows took place.

The unusual sight of a large party of common scoters close inshore, which were diving continuously for young mussels, was noted on July 14th and again on the 17th. The number of them was estimated at about 400.

Large numbers of white butterflies came in from the sea on July 21st and on September 4th.

Skuas began to prey on the terns on July 21st when eight Arctics arrived, and on August 6th there were four great skuas resting on the ridge beyond the ternery. On July 30th numbers of terns and gulls were feeding on the whitebait stranded in

a pool left by the tide, and skuas were flying round taking the fish from both terns and gulls.

On September 2nd there was a movement of waders, notably common and green sandpipers and greenshank. Large flocks of starlings flew in from overseas on September 4th, and again on October 3rd when hordes of tired birds were resting on and all round the Hut.

The first kingfisher seen since last autumn was observed on September 6th.

A party of fifteen golden plover were seen by Mr. R. J. Foster on the 15th.

On September 18th there was an immigration of small birds, goldcrests, thrushes and blackbirds, also numbers of wigeon.

On September 29th the first party of bramblings was seen and nine snow-buntings were feeding on the shingle at the ternery end of the Island on the 24th.

Redwings, mistle thrushes, bramblings, chaffinches, blackbirds and wheatears flew in from the sea on October 14th and the first grey crow was noted.

On October 16th there was another influx of small birds and also of wood-pigeons. Four purple sandpipers were on the mussel beds of the harbour on the same day, and another was seen on October 28th.

A party of nine Brent geese arrived in the harbour on October 27th.

On November 21st a huge flock of wood-pigeons was seen travelling westwards. Mr. S Everitt estimated that it took five minutes for them to fly past his house at Burnham Norton, and later they were seen all over the village of Brancaster Staithe.

BLAKENEY POINT.

At the opening of the year there was a great gathering of wildfowl in Blakeney harbour. On January 4th the wigeon there were estimated at 3000, and there was also a large flock of Brent geese.

A velver scoter and several great northern divers were also in the harbour. These were joined by a number of sheld-duck on January 22nd followed by a big company of coots and some

mallard on February 18th, so that by this time there were ducks in every creek.

As the intense cold increased and the creeks became frozen most of the wildfowl left, and for some time there was little bird life to be seen with the exception of a few snow-buntings, shore-larks and brambling on the Point and along the Beechway.

On February 26th a stoat was found in the woodshed on the Point ; it had made a snug nest in an old coat left there.

At this time it was not possible to take a boat from Morston to the Point owing to the frozen creeks and Eales was forced to walk over by way of Cley and the shingle beach.

Almost as soon as the thaw set in and the snow had gone in the middle of March, birds began to return. Robins and pied wagtails were moving in a westerly direction on the 25th and on the following day there were wheatears and common redstarts on the Point and in the suaeda bushes. At the same time there were still a good many Brent geese and wigeon in the harbour.

Of the summer visitors the most notable was a spoonbill seen flying over on May 27th, and three avocets which rested on the sands for two hours on June 10th. They appeared to be tired and allowed Eales to walk to within sixty yards of them. On June 16th a quail, which had apparently been killed by a car, was picked up on the Morston road.

Black terns were seen frequently during the summer but not in such numbers as last year.

The fulmars nesting near Sheringham were often seen flying along the shore.

As at Scolt Head rats were a great nuisance on the ternery at the beginning of the breeding season and took many eggs before they were disposed of.

Breeding Birds.

Common Tern ... 1550 nests were counted, rather more than last year. The first birds were seen on April 18th but most of them did not arrive until May 2nd. As usual a large number of the early hatched chicks died but the later ones did well and were reared successfully.

Arctic Tern	Six nests were identified.
Sandwich Tern ...	The first bird was seen on April 16th. By May 13th there were thirty pairs but after laying a few eggs they left on the 16th. One pair was left and these reared young.
Little Tern	On April 12th the first bird was seen and more arrived from time to time until there was a total of sixty-three nests well spaced out along the beach as far as the Big Low.
Ringed Plover ...	There were ninety-two nests counted, many fewer than last season owing to the number which died during the winter. The first eggs were laid on April 28th, rather a late date for these birds.
Oyster-catcher ...	Thirty-nine nests counted. The first eggs appeared on April 29th.
Redshank	Eighteen nests found.
Sheld-duck	Thirty-five nests found.

A roseate tern was first seen on May 19th and on several occasions during the summer. On July 6th one was seen bringing in fish for several young common terns. It was obvious that it had no brood of its own.

From the above list it would appear that disturbance by visitors does not really affect the terns except possibly the Sandwich which is apt to be capricious at the beginning of the season until it has really settled down. There was a great number of visitors to the Point this season and, owing to the extension of the ternery well down the beach towards the dune area, it is becoming increasingly difficult to control them. Most visitors respect the regulations and leave the ternery as soon as they have looked round. Others are not so considerate.

The Autumn Migration began to be obvious with the arrival of greenshanks on July 22nd. A number of small birds, willow-wrens, pied flycatchers and wheatears were passing through on August 6th and again on the 20th. On this

occasion two wrynecks were among them and these remained until the 22nd. On September 8th and 11th the bushes were full of small birds and again in the afternoon of the 18th, following a north-easterly gale.

On September 28th a peregrine was seen to attack and kill a common redstart.

A few wigeon arrived in Blakeney harbour on September 14th.

The first grey geese were resting on the sands of the Point at low tide on September 30th. On October 5th a small party of pink-footed geese flew down the harbour. On the 17th a few Brent geese arrived.

A little gull was in the harbour on October 15th.

On October 21st four grey phalaropes were seen. Two appeared to be sleeping and all were so tame that they allowed Eales to approach within twenty yards of them.

Woodcock began to arrive on October 23rd and were followed by the "Woodcock" owl.

Three shore-larks, the first seen this season, arrived on the Point on November 3rd.

CLEY AND SALTHOUSE.

The following monthly records of birds in this area are taken from the Watcher's diary, with a few additional notes from ornithologists.

January.

On the first day of the year, in fine weather, two bitterns were flushed from Cley marsh. Whooper swans varying in number from five to fourteen were seen flying over on the 5th, 11th and 31st of the month. A party of shore-larks and snow-buntings were feeding on the north boundary on the 12th and by the end of the month had increased to large flocks estimated at 100 shore-larks and 300 snow-buntings. A few smew in company with some pintail ducks were seen on several occasions feeding on the open water in front of Watcher's Cottage and also on the Big Pool. The Brent geese on Salthouse Broad also increased in number during

the month, making a large flock of 300 birds. A party of thirty pink-footed geese flew over the marsh on the 19th. A common buzzard was seen in the garden of Wiverton Hall on January 26th.

The first snow fell on the 26th accompanied by a gale from the N.E. which increased in intensity and became a blizzard on the 28th. Drifts of snow in exposed places were several feet deep. Up to this time the small party of bearded tits first seen in the reeds of the marsh in the autumn had survived, and Bishop cut patches of reeds at intervals in order to give them a better chance of finding food.

FEBRUARY.

In spite of a slight thaw on the afternoon of the 1st, the marshes continued to be completely frozen and remained so for six weeks. Throughout the month snow fell almost every day, with a blizzard on the 4th and drifts of snow mounting up until some had reached eleven feet in exposed places.

Two glaucous gulls were seen on the 6th. A large party of Bewick's swans were flying off-shore in an easterly direction on the 8th, and another lot of twenty-five were feeding in the Main Drain of the marsh on the same day. The duck which had left at the end of January were replaced on February 10th by a number of tufted, goldeneye, wigeon, common scoters, sheld-duck and shovelers. Three velvet scoters were on Salthouse Broad on the 11th and a beautiful red-breasted merganser. As the result of twenty-three days of continuous frost water-hens were dying of hunger on February 13th. Otter tracks were noticed all over the marsh at this time and on the 15th two were seen collecting and eating the dead water-hens. Many small birds were also picked up dead and a note in Bishop's diary for the 17th is to the effect that the bearded tits had not been seen for several days. Four wax-wings were in a wood at Cley Hall Farm on February 22nd.

To his astonishment Bishop found five Harlequin ducks sitting on the ice of the Main Drain on the 19th, three of them male birds. He became familiar with these ducks when stationed in Iceland during the war. It has been suggested that these birds may have come south with the large ice floes then off the East coast. The last day of wild-fowl shooting on February

21st disturbed hundreds of Brent geese and many ducks, which were seen flying up and down between Salthouse and Blakeney Harbour.

On the last day of the month the wigeon at Salthouse were estimated at four hundred birds; and the number of snow-buntings on the north boundary of Cley marsh was the most ever seen by Bishop there. He estimated that at this time 95% of the water-hens had died of starvation.

MARCH.

Two bitterns were again flushed on the marsh on March 1st. The next day one was found dead of starvation and a second one on the 11th.

There was a slight thaw in the middle of the day on the 2nd and Bishop managed to open a few places in the creeks to give the birds a better chance of survival.

On March 3rd in bright sunshine a song thrush was heard singing.

Two days later there was a return of the Arctic conditions with a blizzard from the N.E. This resulted in snow-drifts five feet deep round Watcher's Cottage, and mallard came to the garden to feed with Bishop's chickens. On the 7th hundreds of ducks returned to Salthouse, among them wigeon, mallard, shoveler, pintail tufted, scaup, sheld-duck and teal.

The slow day-time thaw increased gradually and when on March 12th the wind at last changed to S.W. and rain began, it was felt that the long winter was over. A terrific gale followed on the 16th with a barometer reading of 28.75 but fortunately the wind was off-shore and did not cause flooding of the marsh. The spring call of peewits and redshanks was heard on March 21st. The next day five sand-martins were flying round Watcher's cottage, a very early date for north Norfolk. A bittern was grunting on the 27th, and two days afterwards five successive booms were heard.

APRIL.

On the first day of the month three Sandwich terns were resting on the Salthouse side of the East bank. A mallard's nest with four eggs was found on the 3rd. There were two

garganeys and two gadwall on the Big Pool on the 4th. The garganeys had increased to three pairs later in the month. A pair of stone curlews were seen on Hanging Hill on the 4th. On the 8th Bishop estimated the number of mallard on the marsh as 100 pairs.

A bittern's nest with four eggs was found on the 18th. Large scale migration of martins and swallows was recorded on the 16th and again on the 20th. A yellow wagtail was seen on the 22nd and a nightingale was singing in the road-side gravel pit on the 25th.

Two common cranes were on the marsh on the 28th. These birds which flew off inland were almost certainly the two seen later by Dr. Ley at Yarmouth.

MAY.

Five pairs of garganeys were seen frequently during the month. Numbers of migrants passed through and summer visitors arrived. Two black redstarts were seen on the 2nd. On the 3rd a wood sandpiper arrived with ruffs and reeves, greenshanks, grey plover, whimbrel and common sandpipers. Large parties of bar-tailed godwits and grey plover were resting on the Salthouse marshes on the 8th. A gull-billed tern was seen by Mr. E. C. Rose and Bishop on the 9th ; also an unidentified warbler which they believed to be an aquatic warbler. Black terns were frequent visitors ; the largest number seen was nine on the 13th.

The eggs in the first bittern's nest were hatching on the 12th, and in the second one on the 16th. The first brood of mallard was seen on the 13th, and the first brood of sheld-ducks on the 22nd.

Two little gulls were identified on the 13th and these stayed for several days. A spoonbill was feeding in the Big Pool on the 18th and remained for some time. It was joined by a second bird on the 29th and there were three on the last day of the month.

A Temminck's stint was identified on the 26th and again on the 30th.

A Kentish plover first seen and identified by Sir Bernard Bourdillon on May 29th was also seen by Mrs. Meiklejohn and Bishop.

An account of a white-winged black tern seen by Miss C. James and Mr. and Mrs. C. Rose on the 19th of May and of a whiskered tern on the 24th is given in miscellaneous notes.

JUNE.

June opened with very warm weather and light easterly breezes. A pair of gadwall were seen by Bishop when collecting material, for repairing the bridges on the marsh. He found two red-backed shrikes' nests not far from the hut. A single spoonbill was seen on the 3rd and remained on the marsh for a week. A stone curlew's nest with two eggs was found on Cley Hall farm. The remains of another dead bittern was found on the 23rd. On the 28th quail were heard in the place where they nested last year.

JULY.

Young mallard were first seen flying on July 1st. The first sign of the return migration was the arrival of green sandpipers on the 7th. A black tern was feeding over the Big Pool on the same day and again on the 10th. Two wood sandpipers arrived on the 22nd and there were four on the 25th. At the end on the month Bishop estimated the duck population of the marsh to be between three and four hundred.

AUGUST.

Three wood sandpipers and a greenshank were seen on the 6th and several more on the 11th and again on the 16th when there were also green sandpipers, grey plover, a small party of knot and twenty bar-tailed godwits on the Salthouse side of the East bank. Gannets were passing along off-shore on the morning of the 15th. A large party of forty common sandpipers and about 100 godwits flew over the marsh in the late evening of the 19th. Three Arctic skuas and a party of fourteen gannets, adults and young, were passing eastwards on the 22nd. Some small migrants including common redstarts and pied flycatchers were in the hedges and roadside gravel pit on the 25th. Three black-tailed godwits were on the Cley marsh on the 26th. A little stint and seven curlew sandpipers were identified on the 27th. The first party of thirty wigeon joined the 200 mallard on the Big Pool on the 28th.

SEPTEMBER.

A dusky redshank was feeding on Salthouse Broad on the 2nd. On the 3rd Bishop's attention was attracted by a bird-call he had never heard before and it was a strange sandpiper afterwards identified as a Solitary sandpiper. A description of this appears in miscellaneous notes. On the same day a pair of warblers, believed by Mr. E. C. Arnold to be marsh warblers, were seen feeding young.

A hobby was over the marsh on the 4th, and again on the 5th and 6th, when it was seen to catch and eat a sedge-warbler.

A covey of nine quail were flushed on Cley Hall farm on the 4th.

A little gull was seen by Mr. Rose on the 9th and was feeding over the Big Pool on the 10th. A large snipe believed to be a Solitary snipe was seen on the 18th by Mr. Stokes. On the 19th a hoopoe was feeding on the arable field behind the marshes and was seen by Mrs. Meiklejohn and Mr. Hunt. This bird remained several days and was sometimes seen on the field and also on the fence of the Salthouse road.

Two black redstarts were also seen on the 19th. On the evening of the 24th a party of twenty-two pink-foot geese flew over the marsh. Several reeves, a wood sandpiper, some greenshanks and two green sandpipers were on the marsh on the 25th and 26th. A hobby was again seen over the garden of Watcher's Cottage on the 20th and over the marsh on the 29th. A Jack snipe was flushed on the last day of the month.

OCTOBER.

Eleven Jack snipe were flushed on October 2nd. A merlin was also seen and a marsh harrier was over the marsh for most of the day. A large flock of golden plover passed westwards on the 3rd, and the first woodcock was seen on Cley Hall farm. On the 4th there was a continuous east to west movement of green plover. A grey phalarope was seen at Salthouse on the same day and remained until the 7th. A little gull was over the marsh on the 7th. The first snow-buntings of the season arrived on the N. boundary on the 9th. Eleven white-fronted geese alighted on the marsh on the 15th,

five more were seen on the next day and several small skeins of geese were passing W. on the 17th. A party of late swallows and martins was seen on the 17th, about twenty of each. Seven more swallows were over the reed-beds of the marsh on the 20th and 21st. A wood sandpiper was seen on the 20th and a late green sandpiper on the 22nd. A large number of duck which included wigeon, teal, mallard and shoveler were on the marsh during the last week of the month. Bishop estimated between six and seven hundred teal and wigeon on the 27th. The first grey crow arrived on the 29th. Two more swallows and two green sandpipers were seen on the last day of October.

NOVEMBER.

One house martin seen flying near Watcher's Cottage on the 5th. Three Arctic skuas were flying along the shore on November 16th. Two merlins were seen on the 18th.

BIRD NOTES FROM HICKLING.

By E. PIGGIN.

The snow which began to fall on January 7th went on from time to time throughout February, with occasional blizzards which buried the whole area, including the reed-beds of the Broad, in several feet of snow. This burying of their only source of food and covert proved disastrous for the bearded tits and the colony which had done so well for several years was virtually wiped out.

Thirty-four whooper swans arrived on January 18th, and by the first week in February their numbers had increased to seventy. These were all in one pool which they managed to keep open.

Two marsh-harriers wintered in the area and were seen flying over the Broad in company with two hen-harriers on January 20th.

A strange record considering the bitterness of the weather is of a bittern heard "grunting" on January 24th. Many of these birds died of starvation as well as numbers of water-rails and hundreds of coots.

Vast flocks of duck, mostly mallard, rested on the Broad and were only disturbed by skaters. On February 15th it was estimated that there were 10,000 mallard between Miss Turner's Island and Swim Coots, the largest company ever recorded at Hickling.

Breeding Species

Bearded Tit.—A single male bird was seen on April 30th and on several occasions after this date, but no mate was found for it. It was still about the Broad on August 22nd.

Grasshopper-Warblers.—An average number nested.

Sedge and Reed-Warblers.—Both species were plentiful.

Montagu's Harrier.—One nest with only two eggs, the smallest clutch ever recorded at Hickling. The young were growing well on June 22nd.

Marsh-Harrier.—One nest with four eggs from which three young were reared.

Duck.—On March 17th the weight of water from the fast-melting snow combined with high wind caused a breach in the north bank of the Broad, and the adjoining marshes, including Deary's, were flooded to a depth of several feet. For this reason shovelers and garganey were unable to use their usual breeding sites and sought the higher ground at Heigham Holms. Several nests were found here and later the young were seen on Swim Coots Slade. A brood of wigeon of about two days old were also seen. This is the second year in succession that wigeon have bred at Hickling.

Bittern.—These were heard booming on May 9th. They were very late in breeding and it was decided to leave them absolutely undisturbed. Later a brood of young were found, and it is certain that several pairs bred successfully.

Redshank.—Fewer nests than usual.

Water-rail.—The nests were not looked for but two were found by marsh workers. Judging by the number of birds present at the end of the season they must have done very well.

Barn Owl.—Three pairs survived the winter and bred but only two of them reared their young.

Five harriers were seen on April 25th at Hickling, two male and one female Montagu's and two marsh. On the 28th

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Montagu's Harrier with Prey

eight were in the air over the marshes between Stubb's and Eastfield mills. Some of these birds moved on and others nested at Horsey.

On April 26th a spoonbill was feeding on Swim Coots and it remained until May 6th. It was seen again on the 11th. Another appeared on Rush Hills on May 27th and was seen in different parts of the Broad for several days.

A dusky redshank was identified on April 24th and 26th and on May 4th.

Four black-tailed godwits were seen on May 2nd in company with some bar-tailed, turnstones, greenshanks, grey plover, two sanderlings and a party of dunlin.

A white wagtail was identified on Deary's marsh on April 25th. Two more were seen on September 24th by Mrs. Palmer and Miss Wilson.

The osprey was a frequent visitor during the summer. The first arrived on May 5th and was joined by another bird on the 8th. They remained until May 11th. On May 19th another osprey was seen, which stayed in the area until June 6th ; it was frequently seen fishing. Another bird which arrived on June 22nd stayed for three days, and a fifth record was made on July 8th. This bird was seen to catch a large rudd on July 13th, the last occasion on which it was noted. An osprey was again seen on September 24th, and again on the 27th. the final record for the season.

Twenty black terns were feeding over the Broad all day on May 8th. Others were seen on May 11th, 19th, 22nd and 23rd.

A gull-billed tern was seen flying past the punt on May 13th, as Miss Gay was being taken over the Broad.

A large party of thirty common sandpipers were feeding on Swim Coots on July 27th. On August 8th, there was another smaller party of them with a flock of sixteen curlew-sandpipers and seven greenshanks.

Three corncrakes were flushed from the marshes by litter-cutters on September 2nd. This species has not been seen at Hickling for several years.

The first geese of the winter, a party of thirty white-fronted, were seen flying over Heigham Sounds on the morning of November 11th. Three bitterns were also flying over at the same time.

Members familiar with the Whiteslea reserve will be interested to know that a new wader-ground is being constructed on Deary's marsh. It is hoped that by ploughing it and constructing a low bank to hold shallow water, it will prove an attractive feeding ground next season.

BIRD NOTES FROM HORSEY.

By Major A. Buxton.

The destruction of birds wintering in the Horsey area in 1947 was enormous and is perhaps best illustrated by the absence of wrens. Normally there are many wrens not only about the village but also in the sedge of Brayden. This spring I first heard a wren early in May at my back door and reported the fact to the keeper, George Crees, who replied " Did you see it ? I should like that confirmed." I neither saw nor heard another wren until July. In strange contrast there seemed to be the normal number of hedge sparrows. Starlings were more than decimated and blackbirds did not come into full song until May. Bitterns were reduced to about one-third and water rails to a quarter of the number in 1946. I saw only one coot and two water-hens. No bearded tit has been seen at Horsey since the frost. All the herons seemed to have died but early in April Crees saw a large flock come in from the S.E. and as these birds came over the marshes they all started to call and to plane down ; no doubt they were returning from overseas. The first woodpecker seen after the hard weather was a single great spotted at the beginning of August followed by a lesser spotted on October 7th.

Life at Horsey in the summer was dominated by one individual bird. When it first arrived upon the scene in the last days of March it was described by a neighbour as a new sort of harrier. In fact it was the best-looking cock marsh-harrier I have ever seen with the three main colours black, red-brown and palest blue-grey all sharply defined. It paired with a hen which had already reared three broods on my land in previous years, and I saw him building two nests for her some hundred yards apart on the same day. After some hesitation she selected one of them, helped to complete it and laid her eggs. A fortnight later a second hen marsh-harrier arrived and also a very plain

young cock. The latter was snubbed by this hen and was either driven away or killed by the handsome cock. I had proof that this dominant cock had annexed both hens when I saw him pass prey to hen number two ; while she was eating it he picked up a reed and put it in her nest ; he then picked up a second reed and took it straight off to the nest of hen number one. A third pair of marsh-harriers nested further south but when three of the five eggs had hatched the cock disappeared and had, I imagined, either been shot or trapped. Subsequent events however made me wonder whether the dominant cock had disposed of him. At first this third hen seemed to be managing to find sufficient food for her three chicks but when they were about three weeks old they began to starve and finally died. The reason for this was discovered, for the dominant cock, who now had not only two hens but seven chicks in addition to cater for, was feeling the pinch and was seen bagging the kills of the widowed hen. Moreover, he was not content to steal merely from neighbours of his own kind. About a mile further south there was a pair of Montagu's harriers which Lord Alanbrook was trying to film in colour. We were puzzled one morning when neither parent visited the nest between 8 a.m. and 1 p.m. but to make up for this there were six visits by the hen in the afternoon. The following morning, just after Lord Alanbrook had again settled in the hide, we saw the cock Montagu pass prey to the hen, and suddenly from out of the blue came the robber marsh-harrier which dashed at the hen Montagu and bagging her prey swept off with it in the direction of his own nests. Thanks to this wholesale scrounging in addition to successful legitimate hunting all seven of his chicks in the two nests thrived and flew. If every egg had hatched and every chick had survived he would have had twelve mouths to fill instead of nine. We found at his nests the remains of leverets, rabbits, pheasants, partridges, water rats, redshanks and two full-grown mallard. By the end of September his wives and offspring had apparently gone and he was in sole possession of the parish, but in October he appeared to be on friendly terms with a young bird, presumably one of the seven. That is the story of the most remarkable character among all the birds I have met at Horsey. I dared not risk a hide near one of his nests, but we arranged a hide by one of his favourite perches

in the hope of getting his portrait. He never sat on that perch again but on one occasion, if a photographer had been in occupation, he would have had the chance of a lifetime. An osprey was seen to carry a fish from the mere to the fork of a tree where it wedged the fish and dried itself. It then flew to a perch where it was mobbed by the cock marsh-harrier! the osprey therefore carried its prey to the post fifteen feet from the hide, slowly ate the fish (a large perch) and still more leisurely preened every feather. Next year I shall have a special osprey perch with facilities for wedging fish and a hide within convenient distance of it.

While a party from Oxford, including Mr. Alexander, were on the marshes near the Montagu's harriers' nest a peregrine falcon was seen to stoop on some bird which could not be identified, strike it, pluck and eat it in mid-air. While this was going on the Montagu's cleared off and did not return until the peregrine had left the area. A hobby was watched for an hour over Brayden marshes on May 30th but it did not stop in the area. A barn owl and a kestrel nested in the tower of Horsey church within two and a half feet of each other. The kestrel hatched but the barn owl did not and a corpse of one was found in a boat-house. There were numbers of short-eared owls in the winter, and up to the end of April, but only two pairs stayed to breed. There were no long-eared owls this season.

Numbers of whimbrel passed through in May but did not feed much on the marshes. There was not enough shallow water to attract many waders but a spoonbill, several grey plover and a few ruffs and reeves were seen. It was a very good spring for garganey but no common teal remained to breed; they have not bred at Horsey since the sea-flood of 1938 and shoveller are only just beginning to do so. In the first week of April large flocks of mallard, wigeon and teal appeared and stayed about a week. At this time our normal stock of mallard were nesting and some of them sitting, but none of these visiting flocks showed any sign of pairing.

In the last week of May as I was opening the door to admit visitors to tea I heard a whistle. I am practically sure that it was an oriole but we heard nothing more of it. Early on the morning of June 23rd Mrs. Crees heard a pair of orioles in her garden. They were still there when her husband returned to

breakfast and he saw both of them. They were not seen again but June 23rd seems too late for travelling orioles and I think they may have nested in the County.

A man in the village with a strong taste for sport, tamed a cock pheasant after the shooting season and fed it on bread out of his hand every day throughout the spring.

On October 13th it was obvious that a migration of jays was taking place. If my memory is correct this date corresponds to the large jay migration that takes place regularly on the Continent.

NOTES FROM BREYDON.

By Robin Harrison.

(Mr. Harrison again undertook to be Warden of Breydon during the spring and summer. He is a Special Constable and this gave him authority to warn one or two gunners for shooting out of season. The warnings were sufficient and the offenders gave no further trouble.)

The severe winter of 1947 brought immense numbers of wildfowl to Breydon, chiefly wigeon, mallard, teal, with good numbers of pintail, pochard and shoveler. Big flocks of coot also resorted to the estuary during the frost, feeding on the zostera. This weed has increased on the mud-flats during the past five years.

Tufted duck, scaup and scoters, both common and velvet, were common enough on Breydon during the big freeze-up. All these species were observed feeding in the river Yare, close to the Haven Bridge in the centre of the town.

Smew.—Some fine males on Breydon and the river Bure during the winter.

Goosander.—A party of twenty remained on the estuary long after the frost broke up.

Wild geese.—It appeared that the peak numbers reached the Breydon marshes on December 15th, when I estimated about 3,000 to be in the vicinity; the white-fronted easily outnumbered the pink-footed.

A flock of sixty Brent geese were using Breydon during February and Marclr.

A barnacle-goose was shot on Breydon on January 8th.

A fine flock of two hundred and fifty bean-geese were again using the marshes at Buckenham, near Cantley. This is one of the few places in the British Isles to receive regular visits from the bean-goose.

Peregrine Falcon.—One was seen in the vicinity of Breydon throughout the winter, where it appeared to be getting an easy living at the expense of the small waders. I watched it strike down a dunlin on several occasions, and as it flew overhead, appeared to be plucking its victim.

Waxwing.—Large numbers of these delightful birds were seen in gardens in many parts of the town during the winter. On three separate occasions, I saw a waxwing feeding in some of the town's busiest thoroughfares, and in each instance the food was an apple core.

The spring of 1947 was late coming to Breydon. No quantity of passage migrants appeared on the estuary until May 3rd, when well over one hundred bar-tailed godwit were on the flats in front of my house-boat, and eighty-two grey plover, many of them in full nuptial attire.

Spoonbill.—Seven were seen on Breydon. One on April 29th, four on May 16th, which stayed for several days, and two feeding on the flats on May 30th.

Black Tern.—One seen flying across the estuary on May 5th.

Common Crane.—Two were resting on a marsh close to the estuary wall on the evening of May 8th. These birds were first seen in the vicinity of Breydon by Dr. Ley on May 4th, on a marsh near Caister-on-Sea.

Hen-harrier.—One crossed Breydon from E. to W. on May 10th. This bird was mobbed by the lapwings as it flew over their breeding marshes. Another was seen on July 17th.

Montagu's Harrier.—A male was seen beating low over the marshes on August 4th.

Avocet.—A single bird visited Breydon. It was first seen on August 23rd and remained until well into September.

Sheld-duck.—The number which bred, chiefly in the vicinity of Burgh Castle, was well up to the average of recent years.

The first broods were seen on June 14th. On June 22nd three large parties of forty-seven, twenty-seven and twenty-two young birds, each escorted by one pair of adults, were swimming off the Duffel's Rond.

Redshanks and lapwings again nested on the marshes but this season the redshanks outnumbered the lapwings.

The autumn migration began on Breydon with the arrival of large numbers of whimbrel on July 12th, and from that date good numbers and varieties of waders on passage continued to drop in. Greenshank were particularly noticeable during September.

Several ruffs were seen both on Breydon and on the adjoining marshes during September. On September 7th I walked up to within six feet of four busily feeding in the muddy bottom of a water-less ditch.

Large flocks of golden plover were frequenting both marsh and mud-flat in early October.

Twenty white-fronted geese were reported seen on a marsh close to Breydon on September 24th. On October 1st, sixty of the same species alighted on a marsh near the Lock-gate farm.

A shore-lark was feeding on the rond close to my house-boat on October 19th.

THE SCROBY SANDS.

This huge sandbank lies three miles to the south-east of Great Yarmouth and forms a barrier which breaks the force of the sea and affords a safe anchorage for shipping in the Yarmouth Roads in bad weather. The sand has accumulated in recent years and much of the bank now remains uncovered at high spring tides.

A few terns have used it as a breeding ground for several years and this season their numbers had increased so much that it was impossible to count the nests. The majority of these birds were Sandwich and Common terns, with a smaller colony of little terns and a few pairs of Arctic.

Throughout the late spring and summer holiday-makers were landed on the Scroby Sands whenever the weather permitted the boats to make the trip from Yarmouth beach. Many reports were received of the scandalous behaviour of some of these visitors who took and destroyed hundreds of eggs and allowed children to play with the chicks. Much of this was done in ignorance and the "gulls," eggs which were taken for food were often in an advanced stage of incubation. Reports of this state of affairs were received by the Royal Society for the Protection of Birds and the Norfolk Naturalists Trust from Mr. Robinson and the Town Clerk of Yarmouth. It is reassuring news that the Home Office has since been in touch with the local police and that steps will be taken next summer to prevent a repetition of the ravages which took place on this vast ternery this year.

MISCELLANEOUS NOTES

Hawfinch

At least three pairs bred in the Aylsham district. Others were seen in the Blickling woods during April and May, but no nests were found. On two occasions fledglings were watched being fed by the parent birds, and one was ringed. In the early autumn parties of up to six birds were seen almost daily among the oaks and berry-laden hawthorns of the meadows on the north side of Aylsham. (R. A. Richardson.)

Several were seen at Didlington in the second week in September. On one occasion there was a party of six or eight birds. (J. Parker.)

Mealy Redpoll

A party of eight was seen on the tall weeds growing over the site of the blitzed Wincarnis works in Westwick Street, Norwich. The pale colour and whitish wing-bar were unmistakable. (G. F. B. Robinson.)

Wood-Lark

Rather more in the Aylsham area than in previous years. Three males were frequently heard singing on the wing at the same time during March. The young of the first broods were

on the wing in late May and from the second broods in early July. (R. A. Richardson.)

Grey Wagtail

A single bird was first seen at Aylsham on September 13th and since then two have frequented the mill-race and weir. (R. A. Richardson.)

Willow Tit

Attention was drawn to a pair at East Carleton, near Norwich by the male's trilling note, rather like the spring call of the nuthatch but more subdued. It then flew down from a tree into a hedge and gave a beautiful burst of song, lovely liquid notes with the quality of a goldfinch. The birds were very tame and this facilitated indentification. (G. F. B. R.)

Great Grey Shrike

One was seen on Shouldham Warren by Miss Anne Leake on January 5th. On April 6th, another was perched on the telegraph wires of the Thetford-Brandon road, and was later seen hovering over the heath like a huge dragon-fly. (C. F. Tebbutt.)

A great grey shrike first seen by Mr. G. A. Richardson at Cawston on March 18th remained in the district until April 9th. Its favourite look-out was the Rifle Range field telephone cable from which it had an uninterrupted view for half-a-mile in every direction.

A bird of this species was seen several times last winter on a large common at Briston, near Melton Constable. When it first appeared on October 19th, 1946, it seemed very tired, and for half an hour was motionless except for one dart at an insect. It was seen again on February 7th and on March 22nd, when a strong East wind was blowing. From April 1st—10th I saw the bird daily and during that time it was very active, and was usually hunting from the same bush. It is assumed that the shrike seen each time was the same bird; it could so easily escape notice on the 100 acres of uncultivated common on a corner of which my house stands. (B. W. Palmer.)

An unusual summer record comes from Miss Kingston who was staying at Eaton Hall at the time. The "chacking" of a shrike was heard over the rough ground above Bluebell land on the outskirts of Norwich, and a great grey shrike was seen perched on a thorn bush where it stayed for several minutes before flying off into a tall tree some distance away. On subsequent visits a pair of red-backed shrikes were seen but no sign of the larger bird.

Waxwing

The immigration of waxwings which reached Norfolk in November of 1946 continued throughout the early part of this year, and the birds were well distributed throughout the County. They were first seen on the outskirts of Norwich at the beginning of January and, with the onset of blizzard conditions, were well established in the gardens of the city towards the end of the month. On January 26th a party of them appeared in the Castle gardens, and a flock estimated at ninety birds was seen by Mr. R. Gaze in the hawthorns round the ruined St. Michael-at-Thorn church in Ber Street. A single bird was watched by Miss C. E. Gay as it fed on the cotoneaster berries at the foot of the City Hall on February 17th; it was so tame and so hungry that it could have been touched by reaching over from the pavement. Other records from the county are as follows:—A party of eight on Beeston Common, Sheringham on January 3rd (J. Marsham). A dozen feeding on the hips of a wayside hedge near Eaton on January 5th (G. F. B. Robinson). The flock of eight birds reported from Wheatfen by Mr. E. A. Ellis on November 21st, 1946 increased to about eighty, and later diminished to twenty-five in one flock. These were last seen on January 25th. The latest date on which a waxwing was noted was April 17th, when one was was picked up dead in a garden in Surlingham.

A single bird was seen in an apple tree near Holt on November 26th. It dropped to a roadside puddle within five yards of me and drank from it, after which it flew up into an oak tree. (David Hunt.)

This is the first record received for this winter. (Ed.)

Blackcap

A female was seen in the hedge of an Aylsham garden tentatively pecking at hawthorn berries on December 6th, a late date for this warbler in Norfolk. (R.A.R.)

Wood-Warbler

Two were singing in the Blickling beech woods on May 9th. No nests were found but birds were seen again in this favourite haunt in July. A pair was located on June 14th in an Aylsham wood when the nest was almost completed. On the 17th the first eggs were laid and the clutch was complete by the 21st. A cold egg was found outside the nest on the 27th and was replaced, but this did not hatch and another egg disappeared from the nest. The three nestlings which hatched were later ringed. (R. A. Richardson.)

Black Redstart

One seen on the cliffs to the west of Sheringham on March 22nd. (J. and G. Marsham.)

Greenland Wheatear

A bird of this species was identified at Scolt Head on September 7th. It was larger in comparison with other wheatears, grey on the crown, darker on the nape and back, with reddish tinge on the underparts and a very long white eyestripe. (R. J. Foster.)

Hoopoe

The hoopoe already mentioned in the notes from Cley was first seen on September 19th, by Mr. O. D. Hunt. It flew up from the ground near the Beach Shelter as he was parking his car there and an excellent view was had of the bird, both on the ground and perched on some barbed wire near-by. An hour later it was seen flying inland across the marsh, and on the following day was watched by Mrs. Meiklejohn and W. F. Bishop on the south boundary.

Osprey

A number of ospreys passed through Norfolk during the late spring, summer and autumn and were seen fishing in the Broads and the larger lakes of private estates.

One was seen by the lake in Didlington Park on April 22nd, 23rd and 30th. On the 23rd it was fishing in a high wind and made three unsuccessful plunges before it caught its prey. (J. Parker.)

Two were seen together at Ranworth on June 10th and again a week later. On each occasion the line of flight was the same, crossing the small Broad from west to east. (H. C. Davies.)

A dead bird in an advanced state of decomposition was picked up at Ranworth in June. It had been ringed as a young bird at Gustavsberg Veckholm, fifty miles N.W. of Stockholm.

Whooper Swan

Six at Breydon on February 6th, six on Rockland Broad on March 4th and two at Postwick on the flooded marshes on March 25th. (Michael Seago.)

Two seen on Rockland Broad on March 15th. (G. F. B. Robinson.)

Goosander

Goosanders were seen on the Yare within two miles of the Norwich boundary between February 9th and March 19th. At Breydon there was a pair on March 12th, the drake in full breeding plumage. (M. Seago.)

Four brown-headed birds on the river Yare at Postwick on February 20th. (G. F. B. Robinson.)

A red-headed bird was seen on Didlington lake on March 25th. (J. Parker.)

Smew

Smew were present on the Yare in small parties, the largest number at one time being seven. Three beautiful white drakes were seen together and three red-headed birds were still on Rockland Broad on March 25th. (M. Seago.)

Heron

The Holkham Heronry. A number of nests were blown down in the gale of April 8th. On April 11th eighteen nests were counted, six in elm trees and twelve in evergreen oaks. Some of the birds appeared to be sitting and all were very noisy.

Wickhampton Heronry. The number of occupied nests was thirty-five.

Common Crane

An excellent view was had of two common cranes feeding on the Caister marshes near Yarmouth on May 4th. The birds were walking about all the time apparently feeding on the small frogs which abounded on the marsh. They were seen again on the 7th and 8th and seemed particularly fond of some stubble which had been submerged most of the winter. They were very alert all the time and gave the impression of being strayed migrants rather than escaped birds. (Dr. L. Ley.)

Grey Phalarope

An adult in winter plumage with the slight tinge of red on the breast was seen on the shallow fleet at the foot of Little Eye, Salthouse, on the 11th and 12th of October. It was watched feeding on the water, walking on the mud and flying. It was very tame and permitted close scrutiny and sketching. (G. F. B. Robinson.)

Solitary Sandpiper

A bird believed to be of this species was first seen by the Watcher, W. F. Bishop, and later by several ornithologists including Mr. and Mrs. R. F. Meiklejohn, Miss C. K. James, Miss Heinthal, Mr. E. C. Arnold, Mr. Hedley Bell, Mr. and Mrs. C. C. Rose and Mr. G. W. Raynor.

Bishop first saw it on September 3rd on the Cley marsh and realised at once that it was a bird he had never seen or heard before. It flew over the East bank on to the Salthouse marshes and for the next three weeks frequented both places, although it seemed to prefer the Salthouse side. The following is a summary of the descriptions made by those who watched the bird :—

Size : the size of a wood sandpiper ; very slim and elegantly built.
Beak : black and very slender.
Head, crown, nape and back : olive green, patterned white.
Throat, upper breast : buff with darker streaks.
Tail : centre dark, outer feathers white with dark bars.

Underparts ; white.
No white on the rump.
Legs ; opinions varied as to the colour between dark green and yellowish.
Flight ; very fast and irregular.

Avocets Breeding in Norfolk in 1946

In the winter of last year, after the report for 1946 had been printed, it came to the knowledge of the Trust that a pair of avocets had nested in the summer of that year on a marsh on the N. Norfolk coast. It is not known what happened to the birds but the nest was robbed.

That a breeding species should be lost to Norfolk in this way is exasperating for a Trust such as this to report. One of the reasons for the purchase of the Cley marshes in 1926 was to establish it as a breeding reserve for duck and waders, and with the hope that such species as the avocet would return to its one-time breeding haunts there. Had this pair of birds bred here they might have formed the nucleus of a colony. The coast line of Norfolk is a long one and much of it lies within areas still used as ranges by the Army and Air Force. This makes it difficult of access and impossible to patrol, and so long as there are private collectors who pay high prices for skins and eggs there will be accomplices to supply them.

On August 24th of this year an avocet was seen on the north shore of Breydon Water by Mr. Robert Hinde. It was also seen by Mr. Harrison who mentions it in his notes for the area.

Kentish Plover

A bird of this species was identified at Cley by Sir R. H. Bourdillon on the evening of May 29th. Mrs. Meiklejohn was called in to verify it and this she did at once.

White-Winged Black Tern

One seen at Cley on May 10th. Its flight was erratic and swift and this singled it out from the black terns it was with. The head, mantle, breast and underparts were black, rump and tail white, whitish patches on the shoulders, undertail coverts white, primaries and secondaries pearly grey, back and underwing black. (E. M. and C. C. Rose.)

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Green Plover and Chick

Whiskered Tern

A bird believed to be of this species was seen at Salthouse on May 24th. It was larger than a black tern with heavier beak which was very dark red. It had a black crown, white on sides of neck and head, light grey rump and tail, which was slightly forked and had a whitish edge, under-tail coverts white, breast grey, flanks dark grey. It was watched for twenty minutes skimming over the water in company with a black tern with which a comparison was made. (C. C. and E. M. Rose.)

Gull-Billed Tern

A record of this bird seen at Cley on May 8th comes from Miss C. James who knows the species in the Carmargue. It was also seen by Mr. and Mrs. Rose.

On May 9th a gull-billed tern was hawking over Langmere in company with two black terns. It appeared to be shorter, and heavier in flight, than a Sandwich tern and its black beak was also short and thick. (C. E. Gay.)

On May 14th another bird of this species was seen flying over Hickling Broad by E. Piggin and Miss C. E. Gay.

Corncrake

One was flushed at Northwold when partridge shooting on September 16th. (J. Parker.)

Fulmar

These arrived on the Norfolk coast on February 25th when seven were seen. On April 12th the total number of them was estimated at forty. Fifteen holes were occupied in the cliffs west of Sheringham, but a small fall of cliff destroyed some of them, and others were interfered with by boys, so that only five pairs bred successfully. Four of the holes used by these birds were close together and the fifth one was fifty yards further west. It was impossible to climb to these nests so the eggs were not seen, but later on the young were visible from the beach below. The first young bird was seen on August 2nd and thereafter up to the 31st when they all left. It was not established that any of the birds which nested further west reared their young although some eggs were seen. Unfortunately this colony was near an army camp and easy of access. (J. and G. Marsham.)

QUAIL

Two were seen at close range at Stoke Ferry Fen on September 15th. It is also known that quail bred in another locality near Northwold. (J. Parker.)

A covey of nine was seen by W. F. Bishop on a field at Cley Hall farm on September 4th and another covey at Holme Hale by Major Philip and Colonel R. Broke on September 27th.

LITTLE AUK

One was picked up at Blofield by Mr. W. Harker on November 27th. It was very cold at the time, and the first snow of the season had fallen on the previous day.

Signed (on behalf of the Council of the Norfolk Naturalists Trust)

CONSTANCE E. GAY, *Secretary*.

VIII

FENLANDS OF WEST NORFOLK.

C. P. Petch, M.B., M.R.C.P.

In 1944 (Transactions Vol. XVI., Part I, page 18) I drew attention in the Transactions to some areas of semi-natural vegetation in West Norfolk which persisted in spite of the intensive war-time cultivation of the county. Since then I have had the opportunity to revisit some of the areas of fen, and as the risk of their disappearance seems as great as ever, have recorded the following observations of the plants found there. The areas in question are true sedge fens, dominated for the most part by *Cladium Mariscus*, as were the fens of Cambridgeshire before they were drained. Other sedges, of the genus Carex (*C.hudsonii*, *C.rostrata*, *C.nigra*, *C.lasiocarpa*) are locally dominant, as are occasionally rushes (*Juncus acutiflorus*, *J.subnodulosus*). Many of these tracts of land are held in common for the poor of the parish in which they lie, but their usefulness must have declined of recent years. They are now only a source of rough grazing, the cutting of sedge having been largely given up, and the digging of peat which was in vogue at the beginning of the century, abandoned.

In spite of a general similarity in all the lists of species given, significant differences can be noted. All the streams of this part of Norfolk rise in the chalk, and their waters are well supplied with mineral salts, but the Gaywood river flows through the Greensand belt, and it is here that its fens are situated. They are in consequence distinguished by a greater proportion of acid-loving species intermixed with the sedges, and by the existence of small patches of true bog vegetation at the edges of the fen (*Sphagnum*, *Oxycoccus*, *Drosera*, etc.). Species restricted to such bog areas are marked " b " in the lists, and are entirely lacking from the Nar and Wissey fens. The bog is not to be regarded here as a development in succession to the fen, as sometimes occurs, but as a local variation dependent on the acid soil water. For the same reason the dry land surrounding the Gaywood river fens is occupied by bent-fescue grass heath, while that around the others is chalk grassland with such plants as dwarf thistle, rock rose, and squinancy

wort. Other differences, such as the absence of Cladium from Sugar fen and the abundance of the wild columbine at Caldecote (in 1932) are less easy to explain. Deeper standing water is responsible for the great bladderwort at Derby fen, but it is difficult to account for the restriction of the pillwort to this locality. Neither plant is common in West Norfolk.

The natural development of fens of this type is through the growth of scrub to woodland ("carr"), prevented here by grazing. This factor operates with varying intensity. At Marham, the eastern fen, now in the possession of the water company and not grazed, bears a profusion of shrubs (thorn, ash, *Rhamnus catharticus*, and both species of *Viburnum*); the western one, in strong contrast, is grazed by the village cattle and shows no bushes at all. I have made no recent observations in the Wissey valley, but the same species are the invaders. In the Gaywood river fens, on the other hand, colonisation is by birch and alder which are quite thick in parts of Sugar fen but absent from Derby fen, Leziate fen being intermediate. The preservation of these areas, as I have remarked before, will depend upon the maintenance of a certain level of grazing, and the absence of efficient drainage.

LIST OF FENS.

Gaywood River Valley.

1. Derby fen. A strip on the North side of the river, half a mile long and a few hundred yards wide. Deep peat is found at the East end and bog along the North side. The flora is very mixed, but bushes are absent.

2. Leziate fen. A rather larger area, with bog along the South side and acid-loving species such as *Erica tetralix* scattered among the sedges. In spite of grazing there has been some colonisation by birch trees.

3. Sugar fen. A small patch bordering a heath. It is much invaded by birch and alder, and has bog along the North side.

Nar Valley.

4. Lamb's common. Another small area, little invaded by shrubs, bordered by chalk grassland. There are no acid-loving species.

5. Marham East fen. An irregular rectangle, almost a mile along its greatest length, which is not now grazed and is much overgrown. There are no acidophilous plants apart from some rather sickly *Erica tetralix*.

6. East Walton. A small area about a quarter of a mile in diameter, with scanty invasion by scrub and a few ash and birch trees, surrounded by chalk grassland. There are no acid-loving species.

Wissey Valley.

7. Caldecote fen. This incomplete list was made in 1932 and is included here for purposes of comparison. Acid-loving species are absent ; in spite of grazing and mowing there is some bush growth.

There follows a list of plants forming the flora of each of these fens, numbered as above. The letters indicate the status of the species in each area.

Abbreviations used :—

d—dominant	o—occasional	b—confined to bog
a—abundant	r—rare	m—marginal only
f—frequent	l—locally	v—very

List of species :—	1	2	3	4	5	6	7
Agrostis stolonifera ...	f	f	ld	r	a	o	—
Aira caespitosa	—	c	—	f	a	o	—
Alnus glutinosa	r	o	la	—	—	r	f
Anagallis tenella	o	l	m	—	—	r	—
Angelica sylvestris	—	r	—	f	r	a	o
Anthoxanthum odoratum ...	o	f	r	—	o	—	—
Aquilegia vulgaris	—	—	—	—	—	—	la
Arrhenatherum avenaceum ...	f	r	r	f	m	f	—
Baldellia ranunculoides ...	f	m	m	—	m	—	—
Betula alba	—	lf	lf	r	—	r	—
Briza media	o	1	r	o	f	o	—
Callitriche stagnalis ...	r	—	r	—	—	—	—
Calluna vulgaris	b	—	b	—	—	—	—
Caltha palustris	o	o	f	m	—	lf	—
Cardamine pratensis ...	o	o	r	r	—	r	—
Carex diandra	la	r	lf	—	—	la	—

List of species:—	1	2	3	4	5	6	7
C.dioica	r	—	—	—	—	—	—
C.disticha	f	la	r	f	r	lf	—
C.echinata	b	—	b	—	—	—	—
C.flacca	—	m	—	f	r	r	—
C.fulva	b	r	—	f	—	o	—
C.hudsonii	ld	r	ld	ld	—	m	—
C.lasiocarpa	ld	o	—	—	—	r	—
C.lepidocarpa	r	r	—	o	o	r	—
C.nigra	a	r	ld	o	—	vr	—
C.ovalis	b	r	—	—	—	—	—
C.panicea	lf	la	b	a	f	a	a
C.pulicaris	b	r	—	—	r	r	—
C.rostrata	ld	r	o	r	m	—	—
Centaurea nigra	m	o	—	o	a	f	f
Chara spp.	f	r	r	—	—	r	—
Cirsium anglicum	b	lf	—	r	f	r	—
C.palustre	m	o	o	f	a	o	r
Cladium mariscus	ld	ld	—	r	d	d	f
Crataegus oxyacantha ...	vr	—	—	o	a	r	—
Drosera rotundifolia... ...	b	r	b	—	—	—	—
Eleocharis multicaulis ...	b	—	—	—	—	—	—
E.palustris	a	—	o	—	r	—	—
Epilobium palustre ...	f	—	—	—	—	—	—
E.parviflorum	m	m	o	r	r	r	—
E.tetragonum	b	f	f	—	r	vr	—
Epipactis palustris	a	—	o	—	r	—	—
Equisetum limosum ...	o	—	la	—	—	—	—
E.maximum	—	—	—	la	—	—	—
E.palustre	a	r	o	f	r	f	—
Erica tetralix	b	lf	b	—	o	—	—
Eriophorum angustifolium ...	o	r	b	r	—	r	—
E.vaginatum	—	—	b	—	—	—	—
Eupatorium cannabinum ...	m	o	—	f	o	a	f
Festuca pratensis	r	r	—	r	f	o	—
Filipendula ulmaria ...	vr	r	r	la	o	r	f
Frangula alnus	—	—	vr	—	—	r	a
Fraxinus excelsior	—	—	—	r	f	o	r
Galium palustre	o	o	a	—	o	—	—
G.uliginosum	b	f	r	f	f	f	f

List of species :—	1	2	3	4	5	6	7
Genista anglica	b	lf	r	—	—	—	—
Gymnadenia conopsea ...	r	—	—	r	a	f	r
Habenaria bifolia	r	o	b	—	—	—	—
Holcus lanatus	f	f	a	f	f	f	—
Hydrocotyle vulgaris ...	o	a	f	f	a	r	o
Hypericum acutum ...	m	r	r	o	r	r	—
H.elodes	o	o	b	—	—	—	—
Juncus acutiflorus	a	ld	la	r	r	m	d
J.conglomeratus	o	r	r	—	—	r	—
J.lamprocarpus	m	r	o	m	m	—	—
J.subnodulosus	f	a	f	ld	lf	a	—
Lathyrus pratensis	—	m	—	f	o	r	o
Leontodon hispidus	r	r	—	m	f	f	—
Lotus uliginosus	m	f	a	f	f	m	f
Luzula multiflora	—	o	b	—	f	r	—
Lychnis flos-cuculi	o	r	f	—	—	r	—
Lycopus europaeus	o	r	r	—	r	r	—
Lythrum salicaria	r	f	o	r	—	—	r
Mentha aquatica	o	a	f	a	a	f	o
Menyanthes trifoliata ...	a	o	r	—	r	la	—
Molinia caerulea	o	f	—	—	ld	a	—
Montia fontana	m	—	la	—	—	—	—
Myosotis palustris	r	r	o	—	o	—	—
Narthecium ossifragum ...	b	—	b	—	—	—	—
Oenanthe fistulosa	f	r	f	—	—	—	—
Orchis ericetorum	—	r	f	o	—	r	—
O.latifolia	o	r	r	o	f	r	r
Osmunda regalis	—	vr	—	—	—	—	—
Oxycoccus quadripetalus ...	—	r	b	—	—	—	—
Parnassia palustris	lf	lf	—	—	f	—	—
Pedicularis palustris ...	o	o	o	o	r	r	—
P.sylvatica	b	b	b	—	—	o	—
Phragmites communis ...	r	f	r	r	a	a	d
Pilularia globulifera ...	lf	—	—	—	—	—	—
Pinguicula vulgaris ...	b	r	—	—	—	r	—
Potamogeton polygonifolius	a	r	b	—	—	—	—
Polygala vulgaris	b	o	r	—	m	—	—
Pontentilla erecta	b	a	b	a	a	a	a
P.palustris	a	f	a	—	—	—	—

List of species :—	1	2	3	4	5	6	7
Prunella vulgaris	m	r	m	m	f	r	—
Quercus pedunculata ...	r	r	—	—	—	r	r
Ranunculus flammula ...	f	f	f	—	o	r	—
R.aeris...	m	o	—	r	o	r	—
R.lingua	o	r	f	—	—	—	—
Rhamnus catharticus ...	—	—	—	r	o	r	f
Rosa canina	—	—	—	r	—	r	—
Rubus fruticosus	—	r	r	o	o	o	f
Rumex acetosa	—	f	o	r	o	m	—
Salix caprea	r	o	f	o	o	f	a
S.repens	b	o	r	r	r	—	o
Samolus valeriandi ...	r	r	r	—	—	—	—
Schoenus nigricans	o	lf	—	o	f	o	r
Scirpus fluitans	a	—	o	—	—	—	—
S.pauciflorus...	r	—	—	—	—	r	—
S.setaceus	r	—	—	—	—	—	—
Sium erectum	o	o	o	lf	m	m	—
Sphagnum spp.	o	o	o	—	—	—	—
Succisa pratensis	b	f	r	o	f	f	a
Triglochin palustre	m	r	r	—	—	—	—
Utricularia intermedia ...	a	—	f	—	—	—	—
U.minor	a	r	r	—	—	r	—
U.vulgaris	la	—	—	—	—	—	—
Ulex europaeus	r	o	o	—	r	—	—
Valeriana dioica	r	a	r	a	f	f	o
Viburnum lantana	—	—	—	—	o	—	o
V.opulus	—	—	—	o	r	r	—
Vicia cracca	m	r	—	f	—	o	—

IX

THE FUTURE OF THE BROADS.

By Eric Fowler (Jonathan Mardle).

I have been flattered by a commission to write an article for the Transactions of the Norfolk Naturalists' Society about the Trust properties on the Broads—the particular occasion for doing so being the completion of the purchase of the freehold of the Horsey Estate by the National Trust. I am somewhat dismayed at venturing into such learned company, but I write the article gladly. Barton Broad, Heron's Carr, and Alderfen (that secluded jewel of a Broad) are already safe in the hands of the Norfolk Naturalists' Trust. So is the Whiteslea Reserve at Hickling; and its environs are secured by a long lease to the Trust. Now Horsey comes into national possession, and with it an assurance that whatever happens to the rest of the Broads, that most interesting and unsullied district of the upper Ant and Thurne will remain for me, and my children after me, to enjoy in very much the same fashion as Christopher Davies and dear old Arthur Patterson ("John Knowlittle") enjoyed them. That was in the days when the wherries still plied their trade, Wroxham and Hoveton were genuine villages and separate entities, and traffic jams in Horning Reach were not merely unknown, but inconceivable.

It was, I suppose, in what a future archæologist may call "the middle holiday resort period," that I first began to enjoy the Broads. Yet I feel I am almost linked with the pre-petrol age, because I have sailed John Knowlittle's old "Walrus." My brother bought her for, I think, about as many pounds as J. K. gave shillings for her when he picked her up as a derelict ship's boat on Yarmouth Beach, and made her into his own peculiar version of a cabin cruiser. And in pounds she was very cheap—she had to be, to suit our pockets. My brothers sailed her up from the Waveney to cruise on these very waters that are now safeguarded by the Trusts; for, greatly though the family is attached to the Waveney, we have always held that you have not seen the best of the Broads until you have sailed up the North River. You lived rough in the old Walrus,

and furled yourself like a sail when you crawled into her cabin for the night. I myself was cruising in even more Spartan fashion in an old half-decker at the time. We slept on the bottom boards, under an awning, but by day we were top dogs, for we sailed past the tubby Walrus with yells of derision.

And what, you may well ask, has all this to do with the Naturalists' and the National Trust? Only this—that we lived simply and happily. We had no gramophone, and wanted none. The wind in the trees and the ripple under the forefoot of the boat were our music by day; the cheep of the water-fowl and the splash of the rising fish by night. We enjoyed our evening pint at the Pleasure Boat at Hickling, in good company, and desired not dance halls. We bought sausages, tomatoes, onions, and gingerbread at Stalham—and no hotel could have supplied a finer banquet than our own primus and frying-pan. We had scarcely heard of dyspepsia then, or rationing. The moorings we preferred were those that were most remote—the places where you could sit in the evening and just smoke and talk, and listen to the blessed silence, and the bird and water noises that did not so much break as amplify it. We were not naturalists, but we loved to watch grebes diving, and the fuss of a water hen with her chicks. If we had been lucky enough to hear a bittern, we should have boasted about it for weeks. We loved the Broads in the fashion in which I hope and believe the Trusts will cherish them.

* * *

There is no doubt that nowadays the Broads are overcrowded at the height of the summer season. Barton, Hickling, and Horsey are screened to some extent from the "holiday rush" by Ludham and Potter Heigham bridges, and by the tortuous courses of the Ant and Thurne, which require a certain amount of patient and skilful navigation. But the neighbourhood of Wroxham, Horning, and Oulton in July and August is no place for those who seek the great open spaces. Yet we are asked to make room for more people. A good many of them, with their ignorance of the rules of the river, their skinned backs, their canned music, and their noisy motor-boats, may seem to us, natives of the Broads, like desecrators of all that we most love in our own waters. Yet they must nearly all have the root of the matter in them, else why should they

come to the Broads at all—or, at least, come more than once? It seems to me that these people also love the Broads, and all that is wrong is that they do not yet love them with enough understanding. There is something that bids them get out of the towns into a better place than the crowded seaside resorts, but having found the Broads they cannot immediately slough off the habits of the town.

More of them are coming. Holidays with pay and the boat-letters will see to that. What can we do about it? I say, try to make more room for the visitors. Let them spread themselves, and so have a better chance than they now get in August to see the real Broads, which are quiet. Clear some of the overgrown waters that are now disused. Try, by permission if possible, to get the private waters opened, at least for summer navigation, if not for mooring. Build (in a better shape than Wroxham and Potter Heigham) some new "yachting centres" on the main rivers. Clean the Yare, and make it fit for fish (and human beings) to swim in. Equip a good many new staithes with proper sanitation, drinking water, and little shops.

So much for liberty. Now for regulation—for a certain amount of regulation there must be—if we are in for what the National Parks Committee calls "a million person-days" of holidays on the Broads. I would strictly limit the number of motor-boats licensed for use on the Broads. They are all very well for elderly people, but boring for the young unless they can be driven fast and make a lot of noise. Speed-boats are mercifully confined to Oulton, and the young, in their ignorance, come here from London and the Midlands and hire motor-cruisers, and get very bored. Being bored, some of them behave like hooligans. That is natural and inevitable. A week of chuntering round the Broads in a motor-boat would drive me crazy. The young should be out learning to sail, row, quant and canoe; matching their hands and wits against the winds and the tide. That is how I learned to love the Broads; and how lucky I was! The National Parks Committee are dead right when they say "the less pretentious type of sailing holiday, and the exploration of the water-ways by canoe, should be encouraged." They are right again when they want to cut down the number of motor-boats, and increase the number of sailing craft for hire.

To correct the many sins of ignorance, and the few of outright hooliganism, there must be police, but I would rather have wardens than policemen. That is to say, men of the type of your own admirable Trust wardens and keepers, wise in the ways of the Broads and the wild creatures that inhabit them, happy to instruct and encourage the curious, but standing no nonsense from the "cocky" and the destructive. Your Naturalists' Society would gain a lot of friends and recruits by the work of men like that among the boat-sailers and campers from the towns, most of whom are only too anxious to learn something about the Broads, but do not at present find many people who can help them.

* * *

I do not think there need be any conflict of interests between the boating people and the naturalists. It is, rather, in the best interests of the boating people that the Broads should be kept as the naturalists would like them to be. The holiday-makers, when they come ashore, rarely set foot off the river banks and the roads. They certainly do not enter the marshy breeding grounds of most of the Broadland fauna, and they have all departed before the season of wild-fowling begins. So far from being enemies of naturalists, many of them are potential naturalists themselves, given the sort of guidance and encouragement I have suggested.

I foresee a good deal of shaking of heads at this advocacy of what is, in essence, the idea of the National Parks Committee. Many people do not like it, but I think what they really dislike is not so much the idea of a national park, as the idea of any "development" of the Broads at all. I prefer to face the fact that the Broads are bound to be "developed." They are in fact being "developed," pretty badly, under our very eyes. In some places they are getting more and more like a seaside boating lake, with mechanical boats and mechanical noises on the water, and urban amusements on shore. In others they are fringed with ramshackle bungalow estates. All this will go on much faster and much worse, as soon as the check of post-war shortages is removed. The only thing that can stop it is an administration of the whole locality, for the benefit of all who use the Broads and their environs for recreation, sport or agriculture, and for the restraint of those who are solely

concerned to make as much money as they can out of the holiday traffic. Without some such administration, one part of the Broads will be irredeemably vulgarised, another part will be overgrown or enclosed, and the main rivers will be variously and conflictingly town reservoirs and town sewers.

I rejoice that the Norfolk Naturalists' Trust and the National Trust between them have ensured that at least Barton, Hickling and Horsey shall escape this fate. I hope that if and when a National Park Committee becomes responsible for the Broads, it will leave these, which are the cream of them, under special protection as a nature reserve ; assisting, but not superseding, the people who have so wisely and generously conserved them. But I think that we who love the Broads because we are lucky enough to have been brought up with them, ought to be ready to share with those who do not yet know them so intimately as we do, tolerating some crudities in the beginning for the sake of a wider knowledge to come. The first step has been taken by our own Broads Conference. Their suggestion of an advisory committee over all the authorities responsible for the Broads is excellent, and should be acted upon at once. But in the long run I doubt whether any such body, not possessing either statutory powers or money, can repel the vulgarians and the crude utilitarians.

That is why I think the establishment of a national park here is the best thing for the future of the Broads. It cannot, in the nature of things, be anything like the Yellowstone Park ; but neither need it be anything like Regent's Park. I see it as a place where the harriers can still breed and hunt undisturbed, the bearded tits can nest, and the wild fowl can settle ; yet where thousands of other youngsters can have the same sort of fun as my brothers and I had in the old " Walrus," and maybe learn a bit more than I did about the natural history of the Broads in the process. The two things, as I have tried to show, are not incompatible. Unless I have misconstrued their report very badly, that is how the National Parks Committee also conceived of the future of the Broads—and that is why this article seems to have developed into an argument in the Committee's favour. I do not know whether it is the sort of article that was required for your Transactions. It seems to me that there's precious little natural history and a deal of controversy in it. However, " them's my sentiments."

JONATHAN MARDLE.

X

FAUNA AND FLORA OF NORFOLK.

Miscellaneous Observations.

Compiled by E. A. Ellis.

(*names of other contributor's given in brackets*)

An Alien Bindweed. While the great bindweed *Calystegia sepium* (L.) R.Br. is a common plant in East Norfolk, especially in the river valleys and the bushier parts of Broadland, it is possible that it is confused at times with the introduced south-east European species *C. sylvestris* (Willd.) R. & S. (synonym *C. inflata*) which is to be found on waste ground. Dr. A. E. Mahood noticed a colony of *C. sylvestris* growing by a roadside at Aylsham on 18th July, 1934, when the plants were beginning to flower a little in advance of the native species ; the same patch was still flourishing at the end of September, 1946. Other colonies exist near the riverside at Brundall and at Kirby Bedon. The flowers of both species are usually pure white, but sometimes pink or white with pink ribbing ; those of *sylvestris* are the larger, measuring 3 to over $3\frac{1}{2}$ inches across and they are distinguished by the presence of two large inflated bracts usually covering and concealing the sepals.

Winter Heliotrope (*Petasites fragrans*) comes into flower usually between Christmas and mid-January in Norfolk. Plants were found already in bloom at Surlingham on November 24th, 1947, which appears to be the earliest flowering date on record for this plant in the county.

Coypus Eating Marsh Plants. Observations made at Wheatfen Broad in 1947 showed that the South American swamp beavers (*Myocastor coypus*) at large in the Yare Valley were eating the following plants : greater spearwort, great hairy willowherb, cowbane, great water dock, yellow flag, greater and lesser reed-maces, bur-reed, glaucous bulrush, the sedges *Cladium mariscus* and *Carex riparia*, reed and the rond-grass *Glyceria* maxima ; in summer the animals consumed quantities of duckweed floating on the broads and channels.

No bushes in the sallow carrs have been found barked, even during the great frost, and no signs of any attack on certain common plants have been seen, including sweet flag, yellow water lily, angelica, figwort, meadowsweet, hemp agrimony and yellow and purple loosestrifes.

Norfolk Badgers. The badger must be considered an almost extinct species in Norfolk. Two of these animals were found killed on roads in the Tas valley in the summer of 1947 and it seems likely that an "earth" lies undiscovered somewhere in that area—possibly the only one now remaining in the county.

Pygmy Shrews in the Yare Valley. A pygmy shrew was rescued from the clutches of a cat at Brundall by Mr. Richard Harmer on February 17th, and others were found in the same month at Wheatfen Broad. This, the smallest British mammal, is probably not uncommon on river banks and marsh walls throughout east Norfolk.

Common Shrews in Houses. Three instances of common shrews being caught in mouse traps baited with cheese came to notice in February and March of this year, in houses at Wicklewood, Wymondham and Surlingham. On September 7th, one of these animals, a plump dark-furred example, took up residence in my own house and proceeded to spend its time between the kitchen and a toy cupboard in another room on the ground floor, while making occasional visits to the garden. It continued in this way until about October 20th and then disappeared. While in the house it was seen to eat dried prunes, bread crusts, drops of golden syrup, peelings of apples and pears, grease and sticky toffee-papers and cheese rind. It made regular rounds about every half hour and allowed itself to be handled on several occasions; the house cat ignored it.

A Snail and Bird Parasite. In July and August, 1947, several amber snails (*Succinea putris*) crawling over marsh plants at Wheatfen Broad were seen to contain green-banded grub-like parasites pulsating rhythmically within their tentacles. These were sporocyst outgrowths (*Leucochloridium paradoxum* Carus) of a bird fluke worm *Distomum macrostomum* (Rud.).

The adult flukes lay eggs which pass out with birds' excrement; these are eaten by the snails and develop into larvae which eventually become fixed and produce cylindrical, grub-like "arms" which elongate and contract within the tentacles for the purposes of attracting the attention of birds. Birds peck off the tentacles and become infested with flukes again. The snails grow new tentacles and the sporocysts produce new "arms" within them. The birds attacked are said to be chiefly moorhens and water rails in this country.

Snails. Careful sifting of plant debris deposited by receding floods often reveals minute shells which would otherwise remain undetected. A sackful of flood rubbish from Smotton Common, Saxlingham Thorpe, left by the March floods of 1947, yielded 48 species of molluscs, including a sinistrally coiled specimen of *Retinella nitidula* (Drap.) and four of the minute whorl-snails *Vertigo pygmaea* (Drap.), *V. substriata* Jeffreys, *V. antivertigo* (Drap.) and *V. angustior* Jeffreys. Another bag of similar material from Flordon yielded 49 species, including the same four Vertigos and *Aplexa hypnorum* (L.). There is a little colony of *Vortex lapicida* (L.) at Flordon, in a pit by the Bracon Ash road opposite the entrance to the Hall.

(A. E. Ellis.)

Amphipods. *Orchestia bottae* Milne-Edwards which was recently discovered in Norfolk by Mr. E. A. Ellis at Brundall (*Trans.* xvi, p. 175), extends up the Yare as far as Thorpe; identification of specimens was confirmed by Mr. D. M. Reid.

(A. E. Ellis.)

False Scorpions. *Obisium muscorum* Leach was found abundantly amongst flood rejectamenta on the bank of the river Tas at Saxlingham Thorpe, 12.5.47. A single specimen of *Chernes scorpioides* (Hermann) taken by Mr. E. A. Ellis at Wheatfen Broad in July, 1946, provided what appears to be the first evidence of this species' occurrence in Norfolk; it is a south-eastern species, not hitherto recorded from north of Suffolk. *Chernes nodosus* (Schrank) was found in a house and on flies at Costessey in September and October, 1947.

(A. E. Ellis.)

DRAGONFLIES. Numbers of *Aeshna juncea* (L.) were seen at Sutton Broad on August 19th, 1947. This species was recorded for Norfolk by Balfour Browne (these *Transactions*, VII, 1904, 670), but in a recent handbook (C. Longfield, *Dragonflies of the British Isles*, London, 1937) it is stated to be "apparently absent from all the eastern counties except Cambridge." Males were patrolling to and fro over the water and along the reeds fringing what remains of the broad, keeping to a fairly regular beat, with occasional excursions over the tops of the reeds. The only females seen were two which were egg-laying in a small shallow pool on the south side some distance from the actual broad, not far from Sutton staithe. In my experience, both here and in Surrey, this is a most difficult dragonfly to capture, as it rarely settles or comes within reach of the net; but after several hours of patient stalking a pair were at last secured—the only specimens I have ever succeeded in catching. *Aeshna juncea* in flight is not easy to distinguish from *Aeshna mixta* Latr., which is very common and generally distributed in the Broads district; but the latter is smaller and its habits are different. *Ae. mixta*, though frequently seen flying over water and hawking over and amongst reeds, prefers the leeward borders of woods and carrs, where it habitually flies rather high and often alights on trees, usually well out of reach. Though very elusive and capable of a baffling swerve, it is much less exasperating and difficult to catch than *Ae. juncea*; Lucas (*British Dragonflies*, London, 1899) exaggerates its wariness when he states that "it is almost impossible for anyone to come within reach of a specimen with the net." *Ae. mixta* is often encountered at a considerable distance from water, and has something of the wandering habit of *Aeshna cyanea* (Muller), in company with which it is commonly seen. I recently rescued a female *mixta* which was being savagely assaulted by a male *cyanea*. Two or three males of what was probably *Ae. juncea* were seen on August 22nd, hawking along the channel connecting Crome's Broad with the river Ant, but I failed to secure a specimen for verification. *Ae. mixta* is very numerous in the neighbourhood of Crome's Broad and How Hill, Ludham. *Orthetrum cancellatum* (L.) was noticed at Woodbastwick, 9.8.47 and at Alderfen Broad, 18.8.47. *Sympetrum flavcolum* (L.) was again seen (14.8.47)

at Alderfen, where it was first observed in 1945. Males were fairly numerous, flitting over the fen on the north-west side of the broad, but no females were seen. These are almost certainly descendants of the 1945 insects, so it may be hoped that this rare dragonfly has come to stay.

(A. E. Ellis.)

Grasshoppers. *Metrioptera brachyptera* (L.) was frequent on the wetter parts of Buxton Heath, Hevingham, 5.8.47, where *Conocephalus dorsalis* (Latr.) also occurs. *Meconema thalassinum* (Deg.) was exceptionally common at Thorpe St. Andrew in August, 1947, and individuals constantly entered the house.

(A. E. Ellis.)

A Rose Sawfly. The sawfly *Arge ochropus* (Gmelin in L., 1790) has been found seriously damaging rose bushes in three large rose gardens in east Norfolk during the summer of 1947. The larvae devoured the leaves and, later, many young shoots were permanently damaged by the perfect insects laying their eggs in saw-cuts made in the bark. In each garden where the larvae were found, it was noticed that they were feeding almost entirely on seedling briar stocks which had been imported from the Continent towards the end of the previous year for budding. There were two broods during the summer. Apparently the insect has only once previously been recorded as occurring in Norfolk. It is found, however, more frequently round London and in the southern counties.

(G. E. Deacon.)

Hawk Moths. The year 1947 was notable for the widespread occurrence of humming-bird hawk moths throughout the country in late summer and autumn. Some hundreds of records were received from all parts of Norfolk, commencing with a few between May and July, followed by a sudden increase in late August and a persistence of the moths until late October. Small numbers of convolvulus hawks were seen both on the coast and inland in the autumn and one caterpillar of this species (the brown form) was dug from a potato patch at Neatishead (Mrs. W. Long) on September 2nd. A death's-head moth was picked up along the beach at Hemsby (J. Jackson) in the last

week of August and a caterpillar taken from potatoes at Lessingham on October 15th (Miss G. Morton). A bedstraw hawk visited Petunia flowers at Walcot (J. S. Philbrick) on August 19th and a spurge hawk came to Phlox decussata at Stratton Strawless (A. E. Mahood and J. Wiles) on August 20th.

Apollo Butterfly. A fine specimen of the mountain butterfly *Parnassus apollo* frequented some old lime kilns at Catton from July 23rd to 26th, 1947 (A. Hudson). The insect spent most of its time visiting composite flowers, including ragwort. Its arrival coincided with that of a swarm of large whites, amongst which was a gynandromorph (seen by E. A. E.). It is thought possible that the Apollo wandered from Scandinavia during a period of exceptional weather, when other butterflies were migrating.

Camberwell Beauty Butterflies. The following are details of five out of six or more of these insects seen or captured in Norfolk in 1947. One on pine gum at Stratton Strawless, July 23rd (J. Wiles); one on a rotten pear in a Norwich garden, August 28th; one on rotten apples in a garden at Holt, August 29th (R. P. Bagnall-Oakley) and one at Holkham, October 8th (J. Bellamy). One at Walcot, August (J. Philbrick).

Moths New to Norfolk. Mr. G. W. Todd records his captures of three lepidoptera in the neighbourhood of Wells, none of which appears to have been noticed in this county hitherto: *Conistra erythrocephala* (Schiff.), October 28th, 1945; *Phlyctaenia ciliatis* (Huebn.) at light, July 1st, 1946, and *Leucania albipuncta* (Schiff.), 1947.

Pygmy Butterflies. Many dwarf or pygmy specimens of common butterflies were observed in Norfolk during August and September of 1947; species chiefly affected were small tortoiseshells and large and small whites (A. E. Johnson, Hickling). A very small red admiral was captured at Surlingham (R. Sewell) and a pygmy clouded yellow near Norwich (A. J. Warren).

MEMBERSHIP.

The Society consists of two classes of Members, viz., Ordinary and Honorary Members.

Ordinary Members may be proposed and elected at any meeting of the Society. The Annual Subscription is 10s., payable in advance on election, subsequent subscriptions becoming due on the last Tuesday in March annually. This subscription may be compounded for by a single payment of £8.

Ladies and Gentlemen distinguished for their attainments in Natural Science, or who have rendered valuable services to the Society, may be nominated by the General Committee as Honorary Members, and elected by a show of hands at the next meeting of the Society. Such Honorary Members have all the privileges of Ordinary Members.

SALE OF TRANSACTIONS.

Copies of past issues of this Society's Transactions may be obtained upon application to the Assistant Secretary, c/o The Castle Museum, Norwich, at the following rates :—

All parts of the current volume will remain at full publication price (10 shillings), and thereafter be obtainable at 2s. 6d. for each part, save that no part shall be sold at the reduced rate until three years after publication. The Society's stocks of early numbers have been drastically reduced recently and some parts are out of print (chiefly in Volumes 1 to 8.)

PRESENTED

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PRESENTED
21 MAR 1952

TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

FOR THE YEAR

1948

VOL. XVI PART V.

EDITED BY MAJOR A. BUXTON

NORWICH
PRINTED BY THE SOMAN-WHERRY PRESS LTD., NORWICH.
FEBRUARY, 1949

PRICE 10/-

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R. G. BUXTON	1946—47
THE EARL OF LEICESTER	1947—48
R. PEARCE GOULD	1948—49

BRITISH MUSEUM NATURAL HISTORY

TRANSACTIONS

OF THE

Norfolk and Norwich

NATURALISTS' SOCIETY

FOR THE YEAR

1948

VOL. XVI PART V.

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NORWICH

PRINTED BY THE SOMAN-WHERRY PRESS LTD., NORWICH.

FEBRUARY, 1949

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NORFOLK AND NORWICH NATURALISTS SOCIETY, 1947–1948.

Income and Expenditure Account for the year ended 31st March, 1948.

1948 March 31st	Expenditure.	£ s. d.	£ s. d.	1948 March 31st	Income.	£ s. d.
118	To Cost of Transactions		125 9 4	119	By Subscriptions	186 17 6
	,, General Expenses			2	,, Sale of Publications	5 5 3
24	Postage, Printing and Stationery, ...	49 7 6		121		192 2 9
6	Library Rent	6 5 0		18	,, Interest and Dividends	17 16 10
28	Hire of Lecture Hall	3 8 0		—	,, Sundry Receipts	1 6
1	Subscriptions to Scientific Societies ...	2 12 6				
	Cost of Excursions	3 9 6				
7	Sundries	4 16 5				
			69 18 11			
45	,, Excess of Income over Expenditure for the year		14 12 10			
139			£210 1 1	139		£210 1 1

BALANCE SHEET as at 31st March, 1948.

	Liabilities.	£ s. d.	£ s. d.		Assets.	£ s. d.
	Amalgamated Funds, 31st March, 1947	731 11 3		59	Subscriptions due	63 10 0
	Add Excess of Income over Expenditure			484	Investments	432 6 11
732	for the year	14 12 10		238	East Anglian Trustee Savings Bank Account	296 18 2
			746 4 1	1	Cash in hand	1 3 3
9	Subscriptions in Advance		18 10 0			
116	Barclays Bank Account		29 4 3			
157	Creditors					
782			£793 18 4	782		£793 18 4

Audited and found correct

(Signed) C. R. A. HAMMOMD,

26th April, 1948.

BRITISH MUSEUM NATURAL HISTORY

BRITISH MUSEUM NATURAL HISTORY

I

HON. SECRETARY'S REPORT.

During 1947-48 meetings were held at Norwich Castle Museum as follows :—November 1, 1947 : joint meeting with the Norfolk Research Committee for a discussion of Broadland Problems, led by Mr. J. N. Jennings, with contributions by Mr. J. E. Sainty, Miss J. M. Lambert and others. January 17, 1948 : ' Natuarl History Brains Trust,' with Mr. D. A. P. Gould as question master and Messrs. R. R. Clarke, H. J. Howard, R. Jones, G. F. B. Robinson and E. A. Ellis answering questions. February 14 : lantern lecture ' Marsh and Water at Surlingham ' by E. A. Ellis. Marsh 13 : a display of specimens under microscopes. April 10 : lantern lecture on ' The Environment of Prehistoric Man,' by Professor F. E. Zeuner. April 24 : lecture on ' Mice, Voles and the Coypu,' by Miss Mary Laurie. Mr. Eric Hosking gave a lantern lecture entitled ' Wild Wings,' before a large audience of members and friends in the Stuart Hall on January 3.

The 78th Annual Meeting was held at the Castle Museum on May 8, when the retiring president, the Earl of Leicester, delivered an address entitled ' The Reclaiming of the Holkham Salt Marshes and the planting of the sand dunes to form a protection.' Officers were elected to serve in 1947-48 as follows : President, Mr. R. P Gould ; President-elect, Mr. James Fisher ; Hon. Treasurer, Mr. D. A. P. Gould ; Hon. Auditor, Mr. C. R. A. Hammond ; Hon. Secretary, Mr. E. A. Ellis ; Committee : Miss Benn, Mr. R. Jones and Mr. B. B. Riviere. The retiring Hon. Secretary, Mr. H. W. Back, was thanked for his many services to the Society. The President then proposed and Mr. R. P. Gould seconded that Mr. H. W. Back and Mr. H. J. Howard be elected Honorary Members forthwith in appreciation of their work for Norfolk Natural History and the motion was carried unanimously.

Excursions were held in 1948 as follows :—May 9 : Breydon Walls (leader, Mr. M. J. Seago). June 24 : Hickling Broad. July 11 : Scolt Head Island.

Members of the Junior Branch, numbering 61, spent an enjoyable afternoon at Fritton Lake on April 14th.

II

PRESIDENT'S ADDRESS

THE PLANTING OF THE SAND DUNES AT HOLKHAM.

Presidential Address delivered by the Earl of Leicester to the Members of the Norfolk and Norwich Naturalists Society at Castle Museum, Norwich, on May 8th, 1948.

In a Society of this kind it is not an easy matter to choose a subject which has not already been exhaustively dealt with by far abler pens than mine. In view, however, of recent controversies and the dangers caused by sea-erosion, I thought it might be of interest to try and tell you something about the 3 miles of Sand Dunes plantation at Holkham, which now forms such a unique feature of the North Norfolk coast line.

Just over 100 years ago my grandfather decided to reclaim a large extent of salt marshes which lie immediately to the north of Holkham village, and he started operations by constructing an artificial barrier or wall running due north and south along the Wells harbour and linking up with thes and hills, which run east and west.

It is true that this artificial barrier running as it does alongside a narrower channel, is not exposed to the full fury of the open sea, still even to-day it requires constant attention and supervision, and I am convinced in my own mind, that this costly operation would not have been embarked on if my grandfather had not had some further scheme in mind for strengthening the already existing barrier afforded by the line of sand dunes.

From conversations, which I used to overhear as a boy, I am sure that these hills were originally planted, not entirely from an amenity point of view, but chiefly in order to assist nature in carrying out a scheme for the strengthening of these dunes—a task which would have proved impossible if left entirely to the hands of man.

These plantations have now been in existence for nearly 70 years and have more than justified a very bold experiment, for not only have they added to the beauty of the landscape, but, what is of perhaps greater importance, they have helped to secure the safety of hundreds of acres of valuable land.

In the year 1897 when the trees were in their infancy the English Arboricultural Society visited Hoklham and many members expressed themselves surprised at the thriving condition of the pines growing in pure sea-sand, and they naturally asked what special means or method had been employed.

As far back as the 1850's experiments were tried by sowing pine seeds in balls of clay. This, however, did not answer, and other methods had to be employed. Plants were put in favourable spots in the sand, protected carefully by sods of earth in which marram grass was growing, and duly watched. At the end of the first year all the plants were found alive, having made one or two inches growth. Planting was then started on a larger scale on the bare, cold and desolate sand hills, and my grandfather lived to see them flourishing on a tract about 3 miles long.

No particular method of filling up the ground regularly seems to have been employed, at first the idea being to put a plant in a favourable spot, rather than planting a stated number per acre at a given distance apart.

From the latter part of the 1870's another plan was adopted, hills being planted with Corsican Pines, 8 yards apart, and the ground filled with Austrian, Scotch and Maritime plants at 4 or 5 yards apart. Later on the hills were planted with Corsican Pines mainly at 6 yards apart: Austrian Pines being used to break the wind on exposed places, and Scotch Pines on the sheltered sides to vary the colour with their silvery foliage.

Plants were raised from home-grown seeds, excepting Maritime pines, which were bought as 2 year seedlings. These were reared in a nursey, not a mile from the sand hills, sheltered with holly hedges, but exposed to the northern or sea side, thus partially acclimatizing the plants. The length of time they were in the nursery varied from two to four years, but during that time they were moved every year so that each plant had a short sturdy head with a regular mat of roots, when ready for planting out on the sand hills.

Spring planting was always adopted as it was found that plants put in in the autumn were blown about and got loose in the neck, also labour was more abundant in the Spring, and generally finer weather prevailed.

The total outlay involved per acre varied from 10s. to 20s. no protection was required, rabbits being stringently kept down, and after expense was practically nil. No planting to succeed in its object was ever done cheaper or succeeded better.

Of the species employed, Corsican pine has proved by far the best all round tree. It will stand a large amount of exposure to the sea-winds, rabbits do not seem to touch it, and it rarely loses its conical habit. standing as it does quite isolated in many cases; above all it thrives luxuriantly and is most reproductive in favourable circumstances.

Austrian pine has also proved useful on all the northern or sea exposures. Even on the outside of the hills, with the one side bare to the stem it will form a thick bush on the other side, allowing its neighbours on the inside to go one better.

Scots pine answers best on the landward side, where it grows well, breaking the monotony of the two darker leaved pines, its silvery hue showing very distinct against them. These are the only three species planted now for many years, Pinus Pinaster, used a good deal at one time, being entirely given up. Pinus bisigries was tried and I think there are one or two still alive.

Larch has been tried but has proved a failure except when the pine needles of other trees have formed a thick layer of sub-soil. Silver fir, giant thurya and macrocarpus, have all been planted but do not grow to be of any use.

Any member of the Society who visits this spot to-day, and I can assure them of a hearty welcome, will be struck by the number of self-sown Corsican, which are coming up in thousands and are having the effect of broadening the line of hills, and throwing back the high water mark of the sea, and thus strengthening the defences in a manner never originally conceived. I mention these details, because I want you to realize that this was no haphazard scheme of planting but a serious and thoughtful attempt to assist nature in arriving at a solution, which could never have succeeded without her wisdom and co-ordination.

A few miles to the west of these hills lies a similar line of dunes, protecting the Brancaster Golf Links, and incidently some valuable grazing land. About 40 years ago there were signs of sea encroachment, and my father, who happened to be President of the Golf Club at the time, suggested the planting of the dunes, and offered all the help gathered from the experience gained from the planting of the Holkham dunes. This was turned down on the plea that it would look suburban! Anything less suburban than the 3 miles of Hoklham dunes, as they appear to-day, would be hard to imagine. In spite of the threatened danger, however, a large number of bathing huts were introduced, the marram grass was gradually killed, and the hills began gracefully to disintegrate, and blow away, leaving the sea to work its will. Certain concrete defences have been erected at great cost but what chances have they against the forces of nature and the ignoring of her rules.

May I conclude by quoting an extract from a letter written to my grandfather when he was a boy at Eton. It was written by his father "Coke of Norfolk," at the age of 81.

"My dear Tom,

It cannot be long now before you will be called upon to undertake the management of this large estate. I am an old man, but it has taken me a life time to learn the transcending wisdom of nature. Do, I beg of you, study the laws of nature in every aspect, use them to your advantage and to the betterment of those who live by the land—but do not I beseech you try and improve upon them, for if you do you will be courting disaster."

I think my grandfather must have been guided by those principles in the planting of those sand dunes.

In my opinion there was never an age wherein the laws of nature are being so completely disregarded as they are to-day. One sees it in the cultivation of the land, in the treatment of our rivers and streams, in the planting of our woods and forests, the latter often with a sweeping disregard for the nature of the soil, and the requirements of posterity. It is an age of quick returns, of ready money transactions, of so called up-to-date business methods. Mankind is suffering in consequence, and much of the world's present day troubles can be traced to the pursuance of this policy.

Copyright

P. Wayre P. A. Bagnall-Oakley

Fulmar planing along the cliff top using a foot to steer

III

WILD BIRD PROTECTION IN NORFOLK IN 1948

Report of the Council

The Council of the Norfolk Naturalists Trust is pleased to present to members and friends its annual report with the bird news of Norfolk for the past year.

Subscribers to the Trust's funds have again given it the generous financial help it needs for the maintenance of its nature reserves ; some have stimulated the work with criticism and suggestions, and a large number have shown their interest by visiting its coastal and Broadland properties. To all its supporters the Council is very grateful.

The winter at the beginning of 1948 was a mild one with no heavy falls of snow or prolonged hard frosts to affect bird-life. The summer months, however, were unusually wet, windy and cold and the breeding season for some of the shore-birds, particularly the terns, was disastrous. Other species which were so reduced in numbers during the bitter winter of 1947 such as the kingfisher, green woodpecker, and wren are well on the way to recovering their normal status.

The return of a few bearded tits to Hickling for breeding, and of one pair elsewhere in the county, as well as of a larger colony in Suffolk is encouraging. Moreover others, almost certainly migrants, arrived at Cley in October.

Of the passage migrants noted the American Pectoral Sandpipers at Salthouse and Cley caused the greatest interest and gave pleasure to a number of visiting ornithologists. The Council is indebted to Mr. Bagnall-Oakley and to Mr. Philip Wayre for the beautiful photographs of one of these birds, and also of the Fulmars near Sheringham.

SCOLT HEAD ISLAND.

The mild winter brought no unusual winter visitors to the Island or harbour. The following is a list of the birds seen at this time of the year.

Brent Goose.—The number of these fluctuated as some birds moved on and others arrived, but on the whole there were less than usual; the flock was at its largest at the beginning of

January and again towards the end of February. Some were showing signs of unrest towards the end of the month and by April 10th all but two birds had left.

Grey Geese.—These use the Overy and Holkham marshes in larger numbers and more consistently after Christmas each year, probably having by then cleaned up the potato fields round the Wash. Pink-footed and white-fronted geese were flying before a strong N.W. wind on January 8th and were seen on several later dates.

Whooper Swan.—A single bird alighted in the harbour on March 10th.

Long-tailed Duck.—On March 5th there were two males in the harbour. A single drake in full plumage with a long tail was seen on April 3rd.

Eider Duck.—A female which appeared to be very dark in colour was seen on January 14th. There were oiled birds in the harbour at the time and it is probable that this duck was also stained with it.

Velvet Scoter.—A party of three drakes and two ducks was flying along close inshore on the morning of January 26th; the white wing patches were clearly visible.

Goosander.—Two were flushed from the creek near the Hut on January 27th.

Merganser.—At the beginning of February there was a number in the harbour.

Black-tailed Godwit.—An unusual winter record is of one seen with a party of bar-tailed on January 16th. On March 30th a party of twenty-five black-tailed was feeding on the foreshore, four of them in breeding plumage.

Turnstone.—On January 27th a bird was flying round with a mussel attached to its foot. Chestney has seen a similar occurrence on a previous occasion when a cockle had attached itself to the foot of a ringed plover.

Glaucous Gull.—These were noted on several occasions. On January 8th five were feeding on the mussels washed up by a strong N.W. wind and high tide. They were seen again on the 28th eating the long "ribbon" sea-weed on the beach.

At the end of February, following gales and exceptional tides, a great gathering of large gulls, estimated at a thousand birds were feeding all along the shore of the Island.

Little Auk.—A single bird, the only one seen during the winter, was in the harbour on February 14th.

Great Northern Diver.—Two badly oiled birds were in the harbour from January 10th—14th.

Wood-pigeons.—A huge flock flew in from the sea on the afternoon of January 22nd. This was the largest immigration noted. On February 5th numbers of fieldfares and redwings were seen arriving in the middle of the day and these immediately dropped down to rest on the Island.

Snow-bunting.—A flock of considerable size remained on Scolt Head during the first three months of the year. A favourite feeding place was near Beach Point so that they were the first birds to be seen on landing on the Island.

Shore-lark.—A small party were seen frequently throughout the winter up to March 15th. They were often in company with the snow-buntings on Beach Point. The largest number counted was fourteen.

Short-eared Owl.—Very few frequented the Island during the winter. Three were seen in House Hills on February 27th, when Chestney was working there.

Hen-harrier.—One or two were seen fliyng over the Island and Brancaster golf course from time to time, the latest on April 9th.

Merlin.—These were noted frequently up to the beginning of April.

Breeding Species.

Mr. C. Chestney, who has been Warden of Scolt Head for twenty-two years, is of the opinion that this was the worst breeding season for terns, and other ground-nesting birds such as the partridge, which he can remember. There was hardly any fine weather after the terns' eggs began to hatch and numbers of chicks were smothered by blowing sand, or drowned. All the later nests and young were wiped out in the severe gales at the end of June, which culminated in the flooding of the island on July 8th.

Sandwich Tern	...	The first was seen on April 11th. Eggs were laid on May 14th and the first were hatched on June 8th. The nests were again in small colonies and a total of 175 counted. Of these fifty were destroyed by a family of weasels before the latter were caught. The robbed birds laid again but owing the bad weather very few of the to young survived. After the breeding season, on July 14th, a large company of 500 birds arrived. These may have been some of those washed out from the Scroby Sands.
Common Tern	...	Birds began to arrive on April 14th. The first eggs were laid on May 17th and began to hatch on June 9th. The nests were not counted but were estimated as a good average number. The chicks suffered in the same way as those of the Sandwich and the comparatively small number which flew were the early-hatched ones.
Roseate Tern ...	...	The old male of the pair which has bred for a number of years, recognised by the permanent absence of one primary feather, frequented the ternery from May 23rd for about three weeks and was seen occasionally afterwards. A pair of birds were also seen and heard but did not settle down. These were probably the pair which bred on Blakeney Point.
Little Tern ...	...	Very few were seen until the end of April. The first chicks hatched on June 9th and because most of the nests were on shingle the young did not suffer so much from blowing sand. 103 nests were counted.

Ringed Plover	...	The scrapes made preliminary to the nesting season were first seen on March 6th a fine warm day. The first nest was found on April 11th and chicks were hatched on May 5th. The number of nests was estimated at about the usual for the Island.
Redshank ...	...	Rather more than an average number of nests were found, the first on April 23rd.
Oyster-catcher	...	These were as numerous as ever on the Island and on the opposite shores of " the Nod " and the golf course.
Black-headed Gull	...	There was a large gullery on the marshes near House Hills, but most of the eggs were washed out. The birds then moved to the shingle spits between House Hills and the Privet Hill.
Sheld-duck ...	...	Since the release of the Island as part of an artillery range, these have spread to all the dune areas again. 200 pairs were estimated to be present prior to the breeding season. The first nest with eggs was found on May 10th.
Mallard ...	...	There were considerably fewer pairs than usual and only five nests were found.
Green Plover ...	...	A pair nested in the House Hills for the first time for five years.

Other birds breeding nearby were :—

Garganey Teal	...	One pair on the freshwater marshes hatched seven young.
Marsh-harrier	...	These bred in the neighbourhood and were often seen hawking over the island and adjacent marshlands. The cock was a very handsome bird.

Short-eared Owl ... Two nests were found on the Overy marshes, one with five and the other with four eggs. Judging from the number seen later on it is probable that there was a third nest. On June 20th Chestney saw a short-eared owl pick up a young tern which it carried out of sight.

Black terns passed through in small numbers at intervals during the summer and autumn. The largest party of seven was seen feeding over Norton creek on August 12th.

Arctic skuas made their first appearance on June 25th, when two birds, one of them the light form, were resting on the ternery sands. On July 20th seven were seen chasing one tern, a sign that they were going hungry. One great skua was noted on July 21st, but very few were seen this season.

The first signs of the return migration of small birds were noted on August 12th, when a few pied flycatchers, common and black redstarts, robins and small warblers were in the bushes and round the Hut. Towards the end of October the movement speeded up and on the 26th and 27th the *suaeda* was full of birds which included two blue-throats, common and black redstarts, pied flycatchers, blackbirds, thrushes, redwings and fieldfares. At the same time woodcock were arriving and three were flushed from the marram near the Hut.

A wood sandpiper was by the pool in House Hills on August 22nd and another one in the same place on September 11th.

A dotterel was on the marsh by Felters Hill on September 13th.

A few stone curlews were seen on the island during the autumn. On August 31st one was resting on the sands in company with a little stint.

An unusually large number of yellow wagtails was on the freshwater marshes on August 13th, the biggest flock Chestney had ever seen.

At the end of August a bottled-nosed whale, twenty-eight feet long, and in an advanced state of decomposition, came ashore at Smugglers Gap. The disposal of such a monster presented a formidable task.

The vanguard of the winter visitors arrived on October 1st, when a party of pink-footed geese flew in from the sea and rested on the mud of the Cockle Bight all day. On October the 24th a few Brent geese arrived in the harbour and snow-buntings were seen on the island in company with two shore-larks.

BLAKENEY POINT.

Ted Eales, the Warden of the Point, was assisted by Mr. R. Gaze during the breeding season this year, and both have helped to supply the notes on the nesting birds.

In contrast with the great gathering of wildfowl in Blakeney harbour during the previous hard winter, comparatively few birds of interest were seen there at the beginning of 1948.

A flock of Brent geese had increased to about 200 birds on February 17th, after which it gradually dwindled until all had gone at the beginning of April.

Small parties of snow-buntings and shore-larks, and flocks of brambling were on the Point and along the Beachway during January, February and March.

A large number of bar-tailed godwits estimated at 200 birds were on the shore on February 21st.

Wheatears passing through on March 29th were the first migrants of the spring. On the 31st several fulmars were flying along the shore. An unusually large party of thirty garganey teal were in the harbour on April 6th.

A movement of small birds took place between April 18th and 21st and willow-wrens, blackcaps, common redstarts and one black redstart were seen in the bushes and round the buildings. On May 5th whimbrels were passing through and on the 6th a few spotted flycatchers were seen with willow wrens.

Breeding Species.

The number of terns and waders was about the same as in previous years, but unfortunately the bad weather at the end of June corresponded with the peak of the hatching period. The few young which survived the blowing sand then, were drowned when the whole of the Point was flooded on July 8th.

Sandwich Tern ... The first arrived on the Point on April 16th and they increased in number up to May 4th. A few eggs were laid, but these were pecked and the birds left on May 14th. Others arrived and on June 3rd there were forty-two nests on the Far Point. Unfortunately after these birds had begun incubating a dog belonging to some cockle gatherers swam the channel, ate a number of eggs, and disturbed the colony so much that most of the birds left, and only three broods hatched.

Common Tern ... A good average number nested estimated at 1,500 birds, the first of which arrived on April 20th. The first eggs were hatched on June 7th. The only young which survived were the early-hatched birds which could fly before the gales and flooding took place. These were estimated at about 300.

Roseate Tern ... ... The bird with the missing primary was seen on May 24th and a little later another pair was identified. These three birds appeared to alternate between Scolt Head and the Point until the pair finally settled down on the bare shingle ridge of the Far Point near the Sandwich Terns. On June 23rd the first egg was laid, a typical one with fine markings. The second egg was laid on the 26th and had a heavy band of dark colour round its larger end. The birds were often at the nest together and took turns with the incubation. On July 2nd the eggs were blown out of the nest in a northerly gale. The one with the dark band was broken and

		the other was cleaned up and replaced in the nest. By evening the female was again incubating it and continued to do so until on July 8th it suffered the same fate as all the other terns' nests. The Roseates left at once after this and were not seen again.
Arctic Tern.	... ...	One pair was identified on May 21st and two chicks were hatched on June 19th.
Little Tern	... ...	Well over a hundred pairs were estimated, rather more than last year. The first arrived on April 21st and eggs began to hatch on June 9th. Most of these chicks survived but those of later clutches which hatched at the end of June were all drowned.
Ringed Plover	...	A good number of approximately ninety pairs bred. The first nest was found on April 19th, and second clutches were laid on June 12th, so that most of the young were sufficiently large to escape the worst of the weather in early July.
Oyster-catcher	...	Thirty-six nests were found, the first on April 27th on the Far Point. The nests were well distributed over the higher beaches.
Redshank	... ...	The first nest found on April 29th was in the marram near the laboratory. There was a total of twenty-four, rather more than last year.
Sheld-duck	... ...	Forty-five nests distributed over the dune areas.

On the evening of June 17th two spoonbills were resting on the Beachway marsh.

A Richardson's skua was seen on the Point on July 3rd and others at later dates.

On July 29th a large company of both Sandwich and Common terns arrived, probably some of those whose nests had come to grief elsewhere. It was too late in the season for these birds to settle down again and they did not stay long.

A spotted redshank was in Morston creek on August 21st.

An osprey, first seen by Mr. Will Long on September 6th was flying round the Far Point the next day.

Early snow-buntings were on the Beachway on September 19th.

Two purple sandpipers were identified on the Beachway mudflats on September 25th.

During October a remarkable immigration of golden-crested wrens took place. The first were seen on the 8th and others arrived at intervals until the end of the month. On the 29th flocks estimated in hundreds took covert in the bushes. At the same time many robins, redwings, brambling and snow-buntings were passing through as well as siskins and a ring ouzel. The wind was easterly.

Pink-footed geese were flying westward on October 18th and the first Brent geese arrived in the harbour on the 27th.

CLEY AND SALTHOUSE.

(Monthly records from the diary of the Watcher).

January.

In spite of strong winds it was a comparatively mild month except for three days from 19th—21st, when there was hard frost and light falls of snow. Very few ducks were on the marshes and no coots at all either at Cley or Salthouse, an indication that these birds are still scarce as the result of the previous winter. This month a small party of Brent geese used Salthouse Broad and five white-fronted geese were on Cley marsh on the 15th. During a gale on the 9th gannets were watched from the beach flying S.E., also three Arctic skuas and two great northern divers. A few days later two glaucous gulls were feeding on a dead gannet on the shore. Both marsh and hen-harriers were quartering the marshes on the 12th.

Bitterns and water-rails were flushed frequently by the reed-cutters during the month. The unusual number of twenty-five little grebes were in the Main Drain on the 29th. Snow-buntings and a few shore-larks frequented the shore and north-west boundary of the marsh.

FEBRUARY.

In spring-like weather a bittern was heard making the grunting noise preliminary to booming on the 6th and began booming on the 8th. Colder weather in the middle of the month made them quiet again until the beginning of March. A W.S.W. gale on the 9th brought in a grey phalarope to the pool by Salthouse Eye and it remained there for four days. Three pairs of shield-duck returned to the marsh on the 10th an early date. On the 21st a N.E. gale with flurries of snow brought a number of mergansers into Salthouse Broad and also a velvet scoter. On the 23rd a Slavonian grebe was on the Big Pool. A flock of about thirty golden plover were on a field of the Cley Hall farm on the 26th.

MARCH.

This unpredictable month " came in like a lamb " with fine warm weather, and bitterns were booming well on the 2nd. A few garganey teal arrived on the 3rd and gradually increased to the remarkable number of thirty pairs during the month. The first mallard's nest with eggs was found on the 12th. By the middle of the month the marshes were full of duck and on the 27th seven species of surface-feeding ducks were counted. These were pintail, gadwall, common and garganey teal, mallard, shoveler and wigeon. An early ruff was seen on the 10th and by the end of the month there were twenty-one including a male with a beautiful blue ruff and another with a white one. The first Sandwich terns noted were on the beach on the 24th.

APRIL.

A few kittiwake gulls were on Salthouse Broad at the beginning of the month. Two little gulls were also there on the 2nd. A waterhen's nest was found on the marsh on the 3rd with the bird sitting on a full clutch ; a garganey teal's nest with one egg was found on the 13th ; a bittern's with four eggs on the

14th and another, also with four eggs, the next day. The first bittern chick was hatched on the 17th and the second on the 19th. On April 15th there were still a dozen pairs of garganey teal on the Cley marsh, but eventually some of these left and nine pairs remained to breed, a record number.

The usual early spring migrants passed through during the month but there were no spectacular movements. The first swallow on April 10th was followed by sand-martins on the 13th, nightingales (in the roadside gravel pit) on the 19th, and common redstarts on the 24th. A black-tailed godwit was on Broadwater on the 16th and a dusky redshank on the 19th. An avocet was feeding in the Cley channel in the morning of the 12th and moved to Salthouse in the afternoon. On the 14th it was seen in Blakeney harbour. During this time the watcher had to be on constant watch for trespassers on the marsh, one of whom gave him a great hunt. Such unnecessary work experienced by him and other keepers, was probably the result of the untimely and misleading articles on the return of the avocet to breed which appeared in the local press and in " nature " periodicals.

May.

The first kingfisher seen since last winter was fishing in the Main Drain on the 6th. A few black terns passed through during the month. Several little gulls were seen, one at Cley on the 12th, two in Cley channel on the 14th, one of them an immature bird, and two on the 18th and 21st. Three avocets flew over in the early morning of the 14th and two were on the marsh on the 20th. Wood sandpipers first seen on the marsh on 17th had increased in number the next day, which proved to be the peak of a movement of waders. Among these were twenty-five wood sandpipers, one green sandpiper, eleven reeves and one ruff, three Temminck's stints, one black-tailed godwit and fourteen bar-tailed godwits, as well as four black terns. A spoonbill, first seen on the 23rd, remained on the marsh for two days. Two broods of garganey teal were seen on the last day of the month.

June.

Five spoonbills were on the Salthouse marshes on the 3rd, but they appeared to be upset by the firing on the Weybourne

ranges and moved to Blakeney harbour, where they were seen next day. A single bird was at Salthouse on the 11th. The first brood of sheld-ducks was noted on the 5th. A gadwall duck with a brood of seven young were on the Big Pool on the 25th ; this is the first time this species has bred on the marsh. There was an increase in the number of yellow wagtails nesting and twelve to fifteen pairs were estimated. Herons feeding on the marsh at the end of the month also showed an increase on last year's numbers ; most of them were young birds.

A census of breeding birds on Salthouse and Kelling heaths taken on June 23rd revealed three pairs of stone curlews, fourteen pairs of red-backed shrikes and about thirty pairs of yellow wagtails.

JULY.

A large party of eighty young sheld-ducks in charge of only two adults was on the Big Pool on the 2nd. It would seem that this species loses interest in its offspring once these are hatched. The first signs of the return migration were noticed early in the month with the arrival of common sandpipers on the 6th and a green sandpiper on the 13th. By the 24th there were some of each of these two species on every suitable pool on the marshes. Duck also increased and on the 22nd the estimated number of mallard and teal on the Big Pool was 250 birds. These were joined by four wigeon on the 31st. A marsh harrier was hunting over the marshes for most of the day on the 28th.

AUGUST.

Many waders passed through during this month among them greenshanks, curlew sandpipers, green and wood sandpipers, two Temminck's stints, five little stints, ruffs and reeves, sanderlings, bar-tailed godwits and grey and golden plover. All of these species were seen either at Cley or Salthouse on the 25th, the height of this movement of waders. Black terns were flying over Salthouse Broad on the 9th, and a little gull was there on the 24th. A Montagu's harrier was hunting the Cley marshes on the 19th. In the early morning of the last day of the month an osprey flew over the marsh towards Blakeney, where it was seen later.

SEPTEMBER.

Excitement was caused among visiting ornithologists by a strange wader first seen on September 11th at Salthouse and identified as an American Pectoral Sandpiper. It was feeding on a flooded sea-aster marsh and remained there most of the time for the next ten days. A second bird of the same species arrived on the Cley marsh on September 19th and was joined on October 10th by a third bird. They were in different places on that day, but on the following day they were seen together on "Bishop's pool." Other birds of the month were black terns on the 2nd, a little gull on the 9th, a Temminck's stint with several little stints on the 10th and a black-necked grebe on the 24th.

OCTOBER.

During this month a party of bearded tits arrived on the Cley marsh which are believed to be overseas birds as those which bred in other parts of the County remained in their nesting areas; moreover, a similar influx took place in Suffolk. The first was seen on the 11th and a week later fourteen were counted. A noticeable east to west migration of lapwings and rooks took place on the first day of the month. A purple sandpiper was seen at Salthouse on the 7th. Snow-buntings and shore-larks were back again in their usual haunts on the beach and arable land of the N.W. boundary in the middle of the month. Both marsh and hen-harriers were hunting the reed-beds on the 19th. On the 20th a stonechat, a comparatively rare bird in Norfolk now, and a woodcock were in Bishop's garden. The first grey crow arrived on the 25th, forerunners of the winter, while the last of the summer birds three late swallows were flying round at dusk on the 29th.

NOVEMBER.

Grey crows and rooks were passing all day on the 1st and again on the 3rd. Three short-eared owls were hunting the marshes on the 2nd, and eight were flushed on the 4th.

BIRD NOTES FROM HICKLING.

By E. Piggin.

The only frosts which were sufficiently severe to freeze the Broad after Christmas occurred from February 20th—22nd; for the rest of the winter it remained open and provided food and shelter for numbers of duck and other resident and visiting birds. The species noticeably absent was the coot which up to the winter of 1946-7 was normally present in thousands on Hickling Broad at this time of the year. A similar absence is reported on the adjacent property at Horsey by Major Anthony Buxton.

Marsh-harriers remained to winter in the district again and were seen from time to time. A particularly handsome cock, which later nested in the area, was flying over the Broad on January 11th.

Hen-harriers were frequent visitors during January, February and March. A peregrine falcon flew over the Broad on January 8th, and another was seen to stoop at shovellers over Deary's pool on March 30th.

Whooper swans usually arrive on the Broad early in January and this year a party of twenty-eight came in from an easterly direction on the 12th. Bewick's swans are not such frequent visitors nor as numerous. A single bird of this species was at Rush hills from February 12th—18th.

White-fronted geese arrived with the Whoopers on January 12th. Later on, at the beginning of February, large skeins estimated at a total of 800 birds were seen passing over in a strong westerly gale.

Two bitterns were heard booming in the early morning of January 30th, a very early date, but the colder weather in February silenced them again, as it did the bitterns at Cley for a time.

Early spring migrants began to pass through in March. A spotted redshank remained near Whiteslea Lodge from March 18th—22nd; garganey teal were first seen on the 20th; chiff-chaffs were heard on the 29th and on April 1st the first willow warblers. Sedge-warblers and yellow wagtails arrived

together on April 8th, a grasshopper warbler was reeling on the 11th and reed-warblers made their first appearance on the 22nd. Black-tailed godwits were on Swim-coots on April 12th and on Rush hills on the 22nd.

Four rough-legged buzzards were seen over Calthorpe Broad during a visit there with Mrs. Christopher Cadbury and her family on April 26th. The buzzards were soaring round and round steadily drifting eastward as they circled, a very beautiful sight.

In May the movement of birds was accelerated and the later breeding species arrived. An osprey was fishing over Hickling Broad on May 2nd and 3rd and another arrived on the 22nd and stayed for two days. Black terns were first noted on May 9th and afterwards frequently throughout the early summer. The largest number seen at one time was eighteen.

Two Greenland wheatears were identified on the marsh near Stubbs Mill on May 17th. Wood sandpipers were seen from May 19th—27th.

An unusual visitor in July was a common scoter with six young, all of them strong flyers. It is strange for this sea-duck to fly inland to fresh water in mid-summer.

Another bird new to the area was seen on November 9th, when a black redstart alighted on some old iron near the keeper's house. It was soon chased away by a robin.

Breeding Species.

Bearded Tit.—The return of two pairs to breed after their complete absence last season is most heartening. The first nest was found to have five young on April 15th and all of these were out of the nest on the 27th. Three nests were found, two near Whiteslea, which probably belonged to the same pair, and the other on the Sounds.

Grasshopper Warbler.—These began to arrive in the first week of April. It was estimated that rather more pairs bred than last year.

Sedge- and Reed-Warblers.—Sedge-warblers arrived on April 11th and reed-warblers a fortnight later. Both were plentiful.

Marsh-harrier.—A pair was seen carrying material for a nest on April 24th, and a nest with five eggs was found on May 6th. There were three pairs breeding on the estate, two of which

reared three young. The third hen, an old bird from her appearance, laid one egg and then disappeared. The cock of this pair was a particularly handsome bird.

Montagu's Harrier.—None nested at Hickling this season, and very few were seen there.

Duck.—Mallard, shoveler and garganey teal bred but no wigeon although the latter were seen about during the breeding season. There were fewer shoveler and garganey teal than usual.

Bittern.—Two males were booming at the end of January. Several pairs bred but with the exception of one nest these were not looked for. The nest found had four eggs on May 17th.

Redshank.—Several pairs bred.

Green Plover.—Very few nests but young were reared in each of those found.

Water-rail.—A number were both seen and heard and were believed to have had a good season.

Great-crested Grebe.—Six pairs were on the Broad during the summer. Four nests were found and the young seen later.

Barn Owl.—Two pairs bred, one in the pigeon loft at the end of Whiteslea Lodge.

Other birds such as the song-thrush, wren, hedge-sparrow, long-tailed tit robin and pied wag-tail which were so scarce last year have done much this season towards recovering their normal status.

BIRD NOTES FROM HORSEY.

By Major A. Buxton.

In the winter of 1947—1948 there was a marked absence of all diving duck. About 200 Pochard arrived in November, but left again at once and did not return until February. There were hardly any tufted or golden eye. I imagine this absence of divers was due to a lack of seed of Chara and possibly of other weeds. The largest number of coots seen on Horsey Mere during the winter was four. There were practically no swans of any sort with the exception of occasional small lots of whoopers.

I suppose that the most notable event in the bird line at Horsey in the summer was the presence of two pairs of chiff-chaffs in the garden. Normally we hardly ever see or hear one and none have bred here before, to my certain knowledge, since my arrival in 1931. One pair hatched but I did not find the nest of either. Every season some particular birds seems to have a bumper year and in 1948 it was undoubtedly the common whitethroat. On the other hand there were no lesser whitethroats this year. Owing to the sea-flood there is still not much suitable whitethroat territory in Horsey, and this year it was hopelessly overcrowded and they overflowed into quite unsuitable country. There were enormous numbers of sedge and reed-warblers. I spent much time by a Montagu's harrier's nest near the Waxham Cut, and from an open hide on its bank had an excellent view of my surroundings. The number of sedge-warblers breeding within fifty yards of the Montagu was astonishing. In addition there were three pairs of reed-buntings in that small area and none of them paid any more attention to the harriers than the harriers paid to them. An ortolan bunting was seen on May 24th and a late ring-ouzel on the same date. The garden was crowded with breeding wood-pigeons, stock doves and turtle doves. I never remember such a cooing chorus.

Golden orioles were as tantalising as ever. A single cock came whistling through on May 17th, an early date. Nothing more happened until June 19th, when at 5 a.m. the whistle of a cock oriole woke me and shot me out of bed. Rippling whistles, with constant warbling in between them, came not from one, but from two different places on an oak tree and they were answered by screeching cat-calls. There were glimpses of two birds chasing each other through the branches, and one cock (there were certainly two) flipped across the lawn to another oak. Then as suddenly as they came all three of them, two cocks and a hen, left in a south-easterly direction. During my absence on June 24th Mr. Crees the keeper, and his wife again heard a pair which arrived from, and left in the same S.E. direction.

On March 26th the famous old cock marsh-harrier, who had two families in Brayden marshes in 1947, arrived with wife number one, but although he continued to lord these marshes she disappeared, and two other hens were taken over. One of

these left for some reason, but the other one, a wild young bird of unattractive appearance, laid three eggs and hatched two young but, I suspect through inefficiency, she lost both chicks. I happened to hear of, and visited, a family of three young harriers one and-a-half miles north of Horsey. They were hatched so early that the eggs must have been laid early in April and the only cock harrier I knew to be about then was the polygamist. In early June he was seen to carry a large kill straight towards these three young harriers, and I suspect that the mother was wife number one. I have reason to believe that he had another, to the west of us, i.e., three in all.

Another good-looking and more respectable pair nested on the Mere farm marshes and reared four chicks from four eggs. Unlike most harriers they left the larger bones of their kills at the nest and it was an interesting collection.

At one time there were five cock Montagu's about and three of them waited for hens in Brayden. Two of them were successful and both pairs seemed to have settled down, but one of these left the area and the unsuccessful cock also eventually departed. A third pair nested by Waxham Cut. During their courting period they were very amusing. There was the usual swaggering flight of the cock, his sudden dive on to the hen, the quick aerial dance of the cock up to the hen and her turn over on to her back to give a gentle push with one foot as a warning against too great presumption. The pair near Waxham Cut gave an enormous amount of pleasure not only to naturalists, but to large numbers of the boating public to whom they became very familiar. Two hides were erected, one on the bank of the Cut with a large semi-circular opening in front which was used for photography, and another ten feet from the nest. This was camouflaged with bundles of reed so that it looked like a reed hale in order to prevent inquisitiveness by the public. The hen Montagu thought this a capital plan and found the reed bundles a comfortable seat, in fact the hide became hers and was eventually her chick's main perching place. The old cock marsh harrier often passed close to the Montagues and I was afraid that, with his harem to provide for he might steal their kills, but I never saw him do so, although there were a few aerial combats. I believe that a great many

Montagu's get shot or trapped, anyhow they nearly all disappeared, with the exception of this pair.

Three separate ospreys were seen at various dates. One of them after taking a few bites at a fish hurled it away apparently in disgust; perhaps it was a bream. A convenient perch for ospreys, with an attendant hide, had been erected on the Mere in the winter in the hope of getting an osprey portrait, but nothing ever sat on it, not even a crow. A pair of the latter for the first time in my knowledge elected to nest in my garden. We decided to abide by the rule of non-interference. After they had hatched one of the parents was seen extracting a young starling out of a hole in a tree, but I cannot lay any other crime at their door except the theft of a rotten marsh harrier's egg, which was not serious. The garden birds did not seem to object to their presence as they certainly do to jays and to brown owls.

There were no short-eared owls nesting and this was to be expected, for there were no voles.

I believe we had four bitterns nests here though only one was actually found. There appeared to be more cock bitterns than hens, for a number of fights in the air were seen. On one occasion four went circling up till they were almost invisible, squawking and stabbing at each other, and many times two of them were seen engaged in battles high in the air. There was a shortage of water-rails except at Starch Grass and, apart from that area, I believe we only had one pair.

Ever since the sea-flood a badly drained marsh at Waxham has presented an interesting example of salted conditions. A minor improvement in the dykes has been effected, and the result has been that in this tenth summer after the flood samphire has at last disappeared, but sea spurry is still rampant, and the surface shows glistening white, when the hot sun brings the salt to the surface as the water evaporates.

A cow put its clumsy foot into a pheasant's nest full of eggs and smashed twelve of them leaving three intact in the midst of a horrible mess. A few days later Mr. Crees looked again at the nest and found the hen sitting and the nest cleaned up. She hatched the remaining eggs.

There was another example of a bird's persistence in adverse conditions. For two years a pair of chaffinches have nested in Mr. Crees's garden. This year they built in a rose bush growing against a shed, and after the eggs were laid rain dripped off the roof on to the side of the nest. The birds thereupon altered the shape of the nest, curving in the exposed side so as to avoid the drip. The manoeuvre was successful and the young hatched, when a brown owl arrived and ate them. One of the owls was later found dead in a fireplace having come down the chimney. For some mysterious reason all the barn owls died during the winter.

Owing I think to drought and the absence of shallow pools on the marshes we were very short of breeding duck and waders. Green plover arrived punctually at the beginning of March, but nearly all of them and the redshanks passed on. Garganey appeared in April but did not stay. No teal have bred at Horsey since the sea-flood. Wigeon were seen in the middle of the summer, so I imagine they bred somewhere in the neighbourhood.

On August 24th in the late evening Mr. Crees' daughter called his attention to a brown owl which was making a great deal of noise just outside his house. While listening to it they heard a much louder owl-call which sounded angry and consisted of three or four notes. It was not a call which Crees knew and he is familiar with the notes of all the five species of owls which inhabit Horsey. The brown owl was flying up and down the trees calling all the time, but the other bird maintained his position and kept answering angrily. The next afternoon Mrs. Crees, while walking through the trees at the bottom of my garden heard a large bird bundle out of a thick holly. She just caught a glimpse of it and said it was remarkably large and flew strongly. Beneath the holly was a mass of fresh feathers of a full-grown kestrel. Every attempt to get a further sight of the bird failed. On my return from Scotland Mr. Dove told me that between August 13th and 27th, while talking to a visitor he had heard a remarkably loud owl note and had remarked to his companion that he had never before heard an owl make such a noise. He could not recall the exact date, but it conformed with the Crees' observation. I have no doubt that the bird heard by Mr. Crees and Mr. Dove,

and seen by Mrs. Crees, which killed and ate a kestrel was one and the same, and that it was an eagle owl on its way south from Scandinavia. Early in November both Mr. Crees and Mr. Dove are practically certain that they separately again heard an eagle owl on one night.

The increase of interest in Natural History among the boating visitors has been very marked in recent years. Far more people ask questions about the birds, beasts and plants which they have seen, and moor their boats in order to see some particular thing. I have never had so many letters as this year concerning projected visits to Horsey or so many letters of appreciation after those visits have been paid. Many of these visitors come from long distances from the Midlands or from far away in the south-west.

BREYDON WATER AND YARE VALLEY NOTES.

By Michael J. Seago and P. W. Browne.

(All records are for Breydon unless otherwise stated).

Twite.—First autumn birds seen on October 23rd by the Lock-gate Farm.

Snow-bunting.—First arrivals this autumn were a party of eight on Caister Beach on September 26th. This is our earliest autumn date. The first arrived at Breydon on October 3rd.

Rock-pipit.—Arrived at Breydon October 3rd and one was frequenting the cliffs at Caister on October 31st.

Ring-ousel.—One on the Breydon wall on April 23rd.

Stonechat.—An adult male at Cantley Reservoir on September 29th. The only one we have seen in Norfolk this year.

Long-eared Owl.—One beside the railway line at Breydon on August 14th which appears to be the first ever recorded there.

Short-eared Owl.—Frequently seen during the early months of the year and one pair bred on the Berney Arms marshes, two young were found on May 9th on the marsh and two more young, much smaller in size, the following day in the actual nest. Paul Kirby photographed these birds.

Peregrine Falcon.—Single birds at Breydon on February 27th, March 13th and April 11th.

Kestrel.—A pair bred in the Tall Mill by the north Breydon wall and we found the nest on May 9th when it contained five eggs, the nest was very bulky and constructed of sticks and lined with grasses and a few white feathers. It is exceptional for this species to use any nest material; when we visited the nest-site in April there was no nesting material anywhere.

Rough-legged Buzzard.—One over the Berney Arms marshes on May 14th.

Heron.—Twenty-five occupied nests in Wigg's Carr, Wickhampton and six nests in the Mautby Decoy Wood.

Grey Lag-Goose.—Seven on passage seen at Breydon on March 14th and a single bird there March 20th, also one on the Hardley flood-marshes on April 10th.

Garganey.—We saw this duck in several localities, there were at least five on Rockland Broad on April 9th, up to five on several occasions in April and May on the Hardley flood-marshes, one at Cantley reservoir and a drake on the Berney Arms marshes during May.

Scaup.—One swimming on the Breydon channel on August 7th, the earliest autumn date for this estuary.

Smew.—A female on the Yare at Postwick Grove February 21st and three, one of them a fully adult drake, on Rockland Broad on February 22nd.

Presumed Southern Cormorants (*phalacrocorax carbo sinensis*). —On February 20th and 22nd at Rockland Broad a single Cormorant was observed swimming by Paul Kirby and M. J. S. and appearing strikingly white on the head. Through x8 binoculars and x40 telescope we noted that the face and chin were white, bordered by a black band through the eye; also noticeable black nape patch; remainder of head, neck and throat white, finishing abruptly on the lower neck. A Cormorant in identical plumage was also seen on this Broad on March 19th and 20th, 1947, with twenty-one *Phalacrocorax c. carbo*.

On March 26th at Breydon Water, we all saw seven Cormorants, sitting one behind the other on the mudflats next to the river and all with a large amount of white on their heads, though it varied in extent. At least four agreed exactly with

the " Handbook " plate. We approached to within 75 yards and noted, in addition to the large extent of white on the head and neck, the size of the white thigh patch—much larger than in the British Cormorant. In flight they appeared to have complete white heads contrasting with the black body. All flew down the river towards Yarmouth and very shortly afterwards a thick sea-fog blew over and they were lost to view for the day.

The next day (March 27th) we again saw four of them sitting next to one of the big drains and one came to sit on a Channel post for over half-an-hour close to the estuary wall, and in brilliant sunshine, through a x40 telescope we made sketches and notes. Our composite field description is as follows: Greenish sheen on body, large white thigh patch. Crown, rear of forehead, sides of face, sides and rear of neck and narrow throat band, greyish-white. Crown narrowly streaked grey merging into noticeable black pointed patch on nape. Forehead and thick line through eye black, joining narrower black band under chin, surrounding white cheeks. The white on neck extended about three-quarters of the way down back of neck, but was interrupted in the front by a narrow wedge of black which came up front of neck to a point just below chin. Two were again seen on March 28th.

Black-throated Diver.—One closely observed on Rockland Broad on January 25th by M. J. S., G. Robinson and P. Kirby.

Red-throated Diver.—One on the Costessey Gravel pits from February 8th to 21st. Three off Caister flying over the sea October 23rd.

Black-tailed Godwit.—Several seen at Breydon—three March 20th, two March 23rd, one May 1st, two May 2nd, one May 7th, one June 28th, one August 3rd and one September 29th.

Curlew-Sandpiper.—On the " Lumps " at high tide when the waders congregated we identified this species on several occasions, there were two on July 25th, two July 31st, three August 2nd, four August 3rd, eight August 4th, three August 5th, seven August 7th and three August 14th. All were adults in summer plumage except for one juvenile seen August 4th.

Temminck's Stint.—One at Breydon May 12th, one at Hickling Broad May 16th, two at Breydon May 17th, one on 18th,

one on 19th, two on 20th, one on 21st, two on May 23rd and one on 25th. The Breydon birds frequented both a fresh water pool on the marsh next to the south wall and the brackish dyke by the north wall.

Ruff.—At Breydon one on May 1st and one May 9th, and single birds on July 31st, August 9th and 14th. Two at Cantley reservoir 16th and 19th August.

Wood Sandpiper.—One at Breydon June 17th flying off the flooded Duffel's Rond, another there August 3rd, and single birds at Cantley August 16th and 19th.

Spotted Redshank.—One April 23rd, one in the beautiful sooty-black breeding dress on June 28th and July 3rd—this appears to be the latest spring date for Norfolk. One on the Lumps on September 1st and one at the Berney end of the estuary October 3rd.

Avocet.—One on the Breydon Lumps May 21st. Two came to Breydon on July 31st, remaining in the estuary six days and we frequently watched them delicately feeding in the shallows or on the Lumps at high tide.

Little Gull.—One January 29th at Breydon, on Duffel's Rond by the houseboat, it appeared exhausted and one of us caught it—it was in first winter plumage.

Scandinavian Lesser Black-backed Gull.—One almost certain May 2nd and one definite May 4th.

Kittiwake.—At least three hundred on the Scroby Sands Ternery on June 13th, about twenty per cent. of them adults.

Arctic Skua.—Two off Caister chasing terns on August 23rd and another there September 17th.

THE SCROBY SANDS.

Report by Robin Harrison.

The first trip to the Scroby Sands this year was made on May 30th, following a long wait while bad weather made it impossible to land there. As we reached the bank many hundreds of common and Sandwich terns began to rise from the sands. The Sandwich terns were nesting in compact colonies; in one small area of four square yards eighty-seven nests were counted and in another of about three square yards there were fifty-six nests.

The nests of the common terns were more scattered. During a walk over roughly half the island 368 nests of the common and 217 of the Sandwich tern were counted. It is a conservative estimate that these represented only half of the colony breeding on the sands.

A later trip had to be cut short owing to a rising westerly wind, but on this occasion a small colony of little terns with twenty-seven nests was found to be established.

There is no growth of any kind on Scroby and any bit of wreckage left by the tide is used for nesting cover; such articles as bits of timber, bottles, clumps of sea-weed and even old electric light bulbs afford shelter and practically all the eggs were on the west side of them.

The exceptionally bad weather of this summer prevented further visits and then came the disaster of July 5th, when a gale from the north-west lashed the sea into fury sending waves high over the island and forcing up a tide which appeared from Yarmouth shore to cover the sandbank completely. It was obvious that nothing could survive on it, and on July 14th there was not a chick nor an egg to be found on the whole stretch of the sands, though adult birds were wheeling round overhead. The last trip was made on August 1st. Considerable numbers of common and Sandwich terns were there and a fair number of little terns, too. Fifteen golden plover were also resting on the sands.

MISCELLANEOUS NOTES.

Magpie

At Blakeney, shortly after sunrise on 12th October, two magpies flew in from the open sea at a height of well over 100 ft. After a few minutes on the marshes they flew off over the village rooftops in a S.W. direction. (G. Harold Hunt.)

Golden Oriole

A pair of golden orioles arrived at the north end of Surlingham Wood and were heard calling to one another during the evening of June 7th. Early the following morning both birds were seen by E. A. E., the male snatching caterpillars from leaves

on an oak and the female keeping low in undergrowth. The birds continued to frequent a glade in the wood (birch, oak), working backwards and forwards on a definite " beat " for two days. The cock was last heard late in the afternoon of June 9th and nothing more was seen of either bird after that date. (E. A. Ellis.)

HAWFINCH

Four were seen at Didlington on January 24th. (John Parker.) A female was in a silver birch tree in a garden in Unthank Road, Norwich on 15th April. (G. F. B. Robinson.)

SISKIN

One at Gaywood, King's Lynn, with a flock of chaffinches and bramblings on February 5th. (W. E. H. Fiddian.)

ORTOLAN BUNTING

On May 24th at Horsey a number of redstarts and spotted flycatchers were along the southern edge of the Hall garden. Also, feeding on the ground, was a female ortolan bunting (Emberiza hortulana). (P. W. P. Browne.)

SHORE-LARK

A late bird seen at Blakeney Point on March 23rd. (Aubrey Buxton.)

GREY WAGTAIL

The two birds reported at Aylsham Mill-pool last autumn (1947) remained all the winter. On 25th March a male assuming breeding plumage was in full song on the roof of the Old Mill, but had not attracted a mate by the 29th April, when I left the county. (R. A. Richardson.)

One seen by the river Yare at Keswick on 6th November. (G. F. B. Robinson.)

GREAT GREY SHRIKE

One was seen on Salthouse heath on January 20th by W. F. Bishop, keeper of the Cley marshes, and Mr. Stratton Long.

One was in a garden at Briston on January 26th. It passed from bush to bush but did not stay. (B. L. Palmer.)

WAXWING

Three at North Wootton on February 12th. (W. E. H. Fiddian.)

Two at Cley Hall Farm on November 13th and 22nd. (W. F. Bishop.)

SONG THRUSH

A juvenile ringed at Aylsham on 4th June, 1947, was recovered at West Buckland, Somerset, on 2nd November, 1947 (240 miles S.W.) (R. A. Richardson.)

BLACK REDSTART.

On December 12th on Caister Warren, one seen perched on the rubble and chimney stack of a disused building, and along the cliff edge. (M. J. Seago.)

RING-OUSEL

A female seen in Horsey Hall garden on May 24th. (P. W. P. Browne.)

WRYNECK

One seen at Briston on April 18th flying from ash tree to ash tree and apparently avoiding other species. There was an obvious movement of cuckoos, swallows and martins in progress. (B. L. Palmer.)

NIGHTJAR

A nest found on Kelling Heath on May 30th was on bare open ground and as exposed as a green plover's. (Aubrey Buxton.)

MONTAGU'S HARRIER

A very early bird was seen passing through Wheatfen on March 11th. (E. A. Ellis.)

SPARROW HAWK

One crashed through a large window-pane of a house at Sprowston on the outskirts of Norwich on October 17th. It was a male in first winter plumage with the white supercillary eye-stripe. (W. E. H. F.)

MERLIN

A male seen flying low over the ground at Gaywood on February 2nd. (W. E. H. F.)

SPOONBILL

Five were resting on the marsh to the east of the House hills on Scolt Head Island on June 6th. Three of the birds had crests, but the other two were immature birds. (P. V. Upton and E. B. Robinson.)

BEWICK'S SWAN

Eleven were seen to arrive on Fowlmere on February 26th. (B. B. Riviere.)

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Fulmars on Cliff Edge

Spotted Redshank

One at Blakeney in company with British redshank on April 21st. (W. E. H. F.)

American Pectoral Sandpiper

On 11th September at Salthouse a bird of this species was identified by Major A. Daukes. The bird was very tame and was seen by a number of visiting ornithologists staying in the neighbourhood.

A second bird arrived on the Cley marsh on September 19th. It was joined there by a third on October 10th when both were seen together.

Glaucous Gull

An immature bird on the beach at West Runton on January 1st. Also one seen with a flock of herring gulls on Sheringham beach, November 19th.

[Sabines Gull]

Attention was attracted by the pronounced forked tail and the bird's small size and different flight as compared with the black-headed gulls with which it was seen in the Lynn Cut on January 26th. (W. E. H. F.)

Black Tern

Numbers were over the meres to the S.W. of Thetford on June 12th, the largest number seen together was a party of eight over Ringmere during the evening. The water in Langmere was dropping rapidly at this time. (J. C. Porter.) (Langmere was completely dry by the end of the summer and Ringmere, which generally retains its water a little longer, soon after. Both are still empty now at the beginning of December. C. E. Gay).

Fulmar

Eight had arrived on the Sheringham cliffs on February 14th, and by March 10th there were about thirty birds. Three pairs nested in the cliff to the west of Skelding Hill, in the same place as last year. Two young were seen on July 30th and three others were visible from the beach below on August 10th. In March three fulmars were also seen sitting in a hole in the cliff near Cromer Coastguard station, but these did not breed there. (J. and G. Marsham.)

Fulmars also nested again to the west of Sheringham and appear to have increased there. On June 10th twenty-five pairs were counted by W. F. Bishop, but these did not all breed. On June 21st eleven holes were judged to be occupied.

CORNCRAKE

One seen several times at Briston between the end of April and May 9th. (B. L. Palmer.)

QUAIL

On June 7th a quail was heard calling frequently on the Middleton marshes near Lynn. The shepherd who visits the marshes daily, an unusually observant man in regard to the local birds, heard it at the same moment as I and said it was a note he had never heard before. We did not hear the bird again when working there. (W. E. H. F.)

Signed (on behalf of the Council of the Norfolk Naturalists Trust)

CONSTANCE E. GAY, *Secretary*.

IV

THE ORIGIN OF THE BROADS.

By J. E. Sainty

The origin of the Broads has been a subject of enquiry for more than a century, since Robberds, confusing the Crag with more recent marine deposits, extended the North Sea to some forty feet above its present level, his views leading to a long drawn controversy with Taylor. In 1879 Richard Lubbock in his "Observations on the Fauna of Norfolk" states, "the flat surface of the county, and the consequent sluggish course of the rivers, are the causes which give rise to the Norfolk broads," and he quotes Southey's remark that the word "broad" is "a provincial term used in Norfolk and Suffolk to designate those parts of a river where the stream expands to a great width on either side." Blake, however, in the "Geology of the County around Yarmouth," distinguishes between the two types, "With the exception of Breydon Water the Broads are not in the direct course of the main rivers but occur here and there on either side at distances varying from a few yards to a few miles. There are some, however, that occur in the direct course of the tributary streams and thus literally fulfil the designation as being a broadening of the stream, which some sheets of water called Broads in their present position do not." He considered that broads like Ormesby, Filby and Oulton, which occupy the site of subordinate valleys, are formed by bars being formed across the outlets of the valleys during the silting up process of the main channels."—a view which has met with general agreement.

Clement Reid (Geology of the County around Cromer 1882) wrote," From the recent date of the submergence which formed the Broads and is now causing them to be silted up, the materials washed down by the sluggish streams are generally deposited long before they can reach the sea." H. B. Woodward (Geology of the Country around Norwich 1881) said, "Tidal action no doubt helped largely in the formation of the lower courses of the valleys, while subsequent depression must have allowed the filling in of the deeper parts of the channels and the formation

of the Broads by flooding over wide areas previously excavated." He adds, after referring to the growth of sand banks across the estuary," As the channels at the mouth of this estuary became closed, the influx of the tide was restricted and ultimately prevented ; the rivers in the drier seasons occupied but narrow channels, and these in course of time were embanked and the marshes became dry land." He had earlier noted that the broads " occupy the river valleys, sometimes in the direct course of the streams, but more often separated from them by a bank of reeds, sedges and rushes, through which one or more narrow channels have been cut." It is the formation of these banks which separate the broads from the main stream that has presented so much difficulty, and which until recently failed to receive a satisfactory explanation. Thus the officers of the Geological Survey all agreed that the direct cause of the formation of the Broads was due to the action of the sea but made no real attempt to explain in detail how this was effected.

Ten years later Gregory, in " The Physical Features of the Norfolk Broads," put forward an explanation which Boswell (Geology of the Country around Cromer and Norwich 1933) considered " appears to fit the facts of the case best. That the area as a whole was a drowned estuary in post-glacial times has been suggested by several writers. Professor Gregory supposes the once continuous sheet of shallow water to have been gradually silted up in large part by the detritus brought down by the rivers. Such detritus was dropped delta-wise on both sides of the streams as they entered the broads. Thus the sheets of water were eventually divided up into smaller areas separated from the rivers by levees. The process was rendered possible by the partial damming of the river mouths by the storm-beaches and tidal strands of shingle piled up by the southerly longshore drift from north of Yarmouth to Lowestoft." This view was repeated by Chatwin (Regional Geology of East Anglia 1937), " The Broads originated partly through subsidence in Neolithic times which checked the flow of the rivers, and partly through the barring of the mouths of the rivers by sediment piled up by the south-flowing tides. The streams, being thus checked in their velocity, dropped loads of debris along their banks and so obstructed the tributary streams which consequently spread out. The large shallow sheets of water

originally produced have been and are still becoming isolated by silting." Gregory's explanation was not seriously challenged, though observation of present conditions failed to find any support for the formation across the mouths of the tributaries of levees composed of alluvial mud. However, in 1938 J. N. Jennings carried out borings in the Ant valley and found that the banks separating the broads from the main stream were composed not of alluvial material but of marine clay. His results have been confirmed by post-war boring and by the investigations of Dr. Joyce Lambert in the Yare valley, and it now seems clear that these broads are indeed due to a marine incursion, which laid down a wedge of blue clay in the main channel but failed to deposit this clay in the tributary valleys. The barrier so formed obstructed the flow of the side streams, causing them to form the typical shallow lakes alongside the main stream.

To understand the reasons for this influx of the sea it is necessary to go back to the last glacial period. Under the climatic conditions to which we are accustomed the whole of the water removed from the ocean by evaporation is sooner or later returned by the rivers, bringing the waters derived from rainfall or melted snow. With the approach of glacial conditions more and more of this water became stored in solid form in the great ice sheets accumulating over the northern land areas. Antevs (The Last Glaciation, 1928) suggests as a conservative estimate that the ice sheet at its maximum covered 490,000 square miles and averaged 3000 ft. in thickness, the resultant eustatic lowering of the ocean level exceeding two hundred feet. Thus the land areas stood relatively two hundred feet higher than before, and the whole of the North Sea basin and the fringing areas of the British Isles became dry land, part of the European continent. However, the tremendous weight of this accumulation of ice pressed down the area on which it rested, causing the land to the southward to undergo a compensatory rise. The effect was similar to that undergone by a raft floating on a pond when one edge is heavily loaded. The isostatic adjustment therefore increased the relative elevation of the southern land but lowered the more northerly regions. When the ice melted the influx of the melt-water raised the eustatic level by over two hundred feet and the ocean flooded not only over the areas

formerly part of the sea bed but, in northern regions, over the lands recently ice covered which were slowly rising.

The isostatic rise of the northern land and the sinking of the southern continued by its own inertia beyond equilibrium point, when the process tended to reverse, and a series of vibrations, turning about an axis lying north of Flamborough Head, was set up. The studies of the geologists of the Baltic areas and of H. Godwin in our own Fenland has enabled us to obtain an outline of the post-glacial changes of level. The moorlog or peat containing the fish spear dredged from the Leman Bank shows that in Mesolithic times the level of the North Sea was nearly one hundred and twenty feet lower than now. The level rose steadily till about eighteen hundred B.C. it had risen to some five feet above present O.D., and this incursion deposited the clay which was the direct cause of the later formation of the broads. A recession of the sea brought the level to at least ten feet below that of to-day and was in turn followed by a rise greater than the preceding, just at the beginning of the Christian era. Again the sea receded and by 700 A.D. it was about eight feet below to-day's level ; since then it has on the whole been rising and we have no clear evidence how prolonged this present condition of rising sea—or sinking land—is likely to continue. The raised beaches of Scotland and northern England remain to testify to the tilting up of the northern lands, relieved of the ice weight, whilst the buried forests of the Norfolk and Essex coasts are witnesses of the relative depression of the southern areas.

It is thus clear that the prime cause of the formation of the Broads is the sea ; the marine clay barrier across the mouths of the side valleys has had the effect of forming such broads as Wroxham and Rockland, whilst the building up of the bar across the estuary has led directly to the Ormesby-Rollesby-Filby series. But man himself has been the dominant influence in bringing about their present condition, and Major Buxton has pointed out to me that an account of their origin which ignored this factor would be altogether inadequate and incomplete. Perhaps the earliest modifications were due to the activities of the peat-cutter. H. B. Woodward tells us, " From a memorandum preserved by Samuel Woodward it seems possible that Barton Broad was to a large extent, if not altogether,

artificially formed by excavations for peat. " He states ' It is most probably artificial.' " Mr. Gunn says that " in the Norris M.S.S. it is said to have been called the ' Deep Fen ' in the time of Edward III and may have become water by the continued cutting of the turf out of it, the consumption of which must have been great prior to the introduction of coal. In fact the borders of the Broad are an evidence of it as they are one solid bank of turf of considerable extent before you gain the soil or high ground. A ridge is also left in the midst of the Broad, having at this time only about a foot of water upon it, marking the boundary of the parishes of Barton and Irstead. There was no appearance of this bank of turf on the sides of the Broad extending itself into the water, but its edge appeared very clearly defined as though kept in that state by art." He adds " Hickling Broad, being likewise partly in the parishes of Hickling and Catfield, may perhaps have been enlarged in the same manner, its bottom is, however, very gravelly."

However, if peat cutting has enlarged the broads, it is drainage operations that have fixed their bounds and their shape. Major Buxton has called my attention to this aspect, and I cannot do better than quote his own words, " Am I not right in thinking that most of the Broads of to-day are strictly artificial, *i.e.* bounded, in fact made, by a bank which entirely surrounds them. *e.g.*, Horsey Mere and Somerton Broad are sheets of water with hover and reed beds round them, all well above the level of the surrounding land, and prevented from flooding that land by a bank which encloses them. If the bank were not there not only would the land be flooded but there would be nothing into which to pump the water and thereby drain the surrounding land." He emphasises that with the coming of the windmill pump their banks were essential both as foundations for the pumps and to prevent the return of the pumped water, particularly when the drained marshes began to shrink. The result has been that we now have enclosed broads and embanked rivers all above the surrounding land level. This state of affairs is obviously very different from the conditions before the introduction of the windmills, but resembles a halfway stage to the completely drained Fenland, where practically no broads or bogs remain, and pumping is direct into the rivers and cuts, natural and artificial.

Now what of the future ? This must obviously largely depend on the relative land and sea levels. If the tilting movement continues, the north rising and the south sinking, the Broadland area, already in places below O.D. will become still more liable to floods, the embankments will need to be still higher and the pumps more powerful. The Thames Floods of 1928 and the Horsey Flood of 1938 may be reminders that the post glacial transgression of the sea is still continuing. Ahlmann's glaciological researches on the North Atlantic coasts (Royal Geographical Society's Research Series 1948) points to a general recession of glaciers. " The present rapid shrinkage seems to be the last stage in a recession that began about two hundred years ago, when the glaciers reached their maximum extension in historical, and perhaps in post-glacial times. This recession has resulted in a rise of sea level. The increasing intensity of the recession is also shown by recent changes in the extension of the arctic pack ice, notably in the Russian Arctic and around Spitzbergen, the northward migration of fish and certain birds, and the improved cereal prospects in Iceland. The phenomenon is so widespread that it would appear to be associated with climatic fluctations." Spitzbergen, which in 1900 had only four months ice-free, has this year enjoyed seven. Even a small eustatic change in sea level due to the ice melt, would have definite effects in all areas lying near sea level. Whether the present climatic tendency will continue or whether the climax has been reached and reversion towards glacial conditions is due to set in, remains to be revealed at some future date.

V

LARRY BANVILL'S DIARY OF HIS JOURNEY TO SWEDEN TO FETCH BACK LIVE CAPERCAILZIE IN 1837.

By Anthony Buxton.

I have related in an article which appeared in Country Life, my experiences while photographing Capercailzie on the Don in the spring of 1948. These Capercailzie are the descendants of birds introduced into Scotland 111 years ago after they had, for some reason unknown, become extinct in these islands for about 100 years. My great grandfather, Sir Thomas Fowell Buxton, after piloting the anti-slavery legislation and reform of the penal laws through the House of Commons, was feeling very tired from his labours and determined to take a good holiday in Scotland. Lord Breadalbane offered him the free use of one of his moors at Taymouth, where he greatly enjoyed himself. To repay this hospitality my ancestor determined to try to obtain live Capercailzie and turn them out in Lord Breadalbane's woods at Taymouth, which seemed to him admirably suited to these birds. He wrote to his friend Mr. Llewellyn Lloyd, author of 'Northern Field Sports,' who resided in Sweden, asking him to try to get some of these birds caught alive. Mr. Lloyd had announcements made in the churches of Sweden after divine service to the effect that live Capercailzie were required, and gave instructions as to how to catch the birds without harming them. This was successful, and Sir Thomas Fowell Buxton, on hearing the good news, immediately sent his head keeper from Norfolk, an Irishman named Larry Banvill, to fetch back the birds from Sweden. Only 30 years later it was estimated that there were 2,000 capecailzie in Lord Breadalbane's woods alone.

Larry Banvill's grandson (yes, only grandson), who is still in the employment of members of my family, has in his possession my great grandfather's gun and his own grandfather's diary (5 great volumes of it) and I find the portion relating to old Larry's journey to Sweden and back so interesting, that I give it in full, just as he wrote it 111 years ago. This part of

the diary was published in I think about 1870 in the "Encyclopædia of British Field Sports," which has saved me the trouble of decyphering the rather flowery lettering of the diary itself. Here is the diary.

"Saturday, April 1st, 1837. Yesterday I took leave of my little family, started on the coach to Norwich, and stayed there for the night. To-day I set out on the Ipswich coach. I halted at this town for the night, and agreed for a boat to take me down the river.—Sunday, April 2d. This morning I set out, and arrived at the inn at Harwich about twelve o'clock; the wind in the right quarter for us to sail to Sweden.—Thursday, 6th. This day I helped to take Mr. Lloyd's things to a boat that was going to the yacht; as I was getting into it, I slipped in, and hit my leg against one of the thwarts of it. I hurt it very much.—Tuesday, 11th. This day we weighed anchor. I was sick in a few hours, as also the following day.—Monday, 17th. After a somewhat cold and stormy passage, we this day made the Swedish coast, and got on shore.—Thursday, April 20th. At nine o'clock on this day I gained the long-wished-for spot (Mr. Lloyd's house near Venusburg), and all seemed as pleased to see L. Lloyd, Esq., as I should be to see my worthy master after a long journey. There are thirteen of those great birds for me to see in the morning.—Friday, 21st. This morning I was up at an early hour, and saw the birds; they look well—only one hen, which I fear will not be long here. L. Lloyd, Esq., went to Troulhatten after the men to come to make the coops for the birds, which are about five feet in length by three and a half in breadth, with a division in each of them to enable me to clean them out on the sea if all is well. This day I saw martins.—Thursday, 27th. This morning another cock came to us; I was happy to see it; a fine bird it is. I was chiefly receiving the birds this day. L. Lloyd and his men went out to fish.—Thursday, May 4th. This day I am happy to say that there are three of the coops fit for my birds.—Friday, 5th. I got the whole command of the birds this day. One old cock died yesterday. I shall skin him. We had put the old cock in a cage by himself, and two in each apartment. This was a busy day with me, in doing all things for the birds.—Saturday, 6th. This morning I found the birds in the house were fighting; but what was the cause I knew not. I now and

then put some of them into other apartments to see if it would be over ; they were, however, not so easy to be put off, for one of their legs was broken. We were forced to put them in the coops by themselves. I was so sorry to see them fight, as I did not know when it would be over. We were all employed after the birds, as they seemed to be coming from the forest to us in good style. The cock that died weighed nine pounds. My leg was very painful to me.—Wednesday, 10th. This morning I did all things for my feathered tribe. The cock that I said was hurt ; this day he is dead ; his leg was broken in two places. —Saturday, 13th. This day I skinned two of the great cocks, and as I was dressing the skin of one of them, a drop of the stuff flew in the corner of my right eye ; it is very painful to me. I keep watching every day for some of the eggs, but no sign of them yet.—Sunday, 14th. This day I was obliged to keep at home to keep the people from tormenting my little feathered family, as I had them now to attend to in this country. They all look well, with the exception of one hen. She feeds well, but did not go up to the roost.—Monday, 15th. This is a great holiday with them in this part of the world. We got a hen (black game), also some eggs. I went into the woods with a man, to see if he could show me a kind of grass the birds are fond of ; but I am sorry to say it was not grown that he could find it. We again returned home with plenty of moss out of the woods to make some nests for the hens to lay in, in my houses, or to try if they would lay in them ; they are all doing well, and I am happy to have it to say of L. Lloyd, Esq., that he is doing all in his power to get all he can for my master, as he says there were four or five dozen on the road, or ten, or perhaps more. Cold at night. It rained this day.—Wednesday, 17th. At this present time we have only one capercallie's egg, two black game eggs ; they call them *arro* in this part.—Saturday, 20th. A man came to inform Mr. Lloyd that he had got a capercallie in a house, also a blackcock, one egg of the black game, and four of the capercallie.—Monday, 22d. This morning I was well pleased to hear the black game that were in the house playing the same as when in the wood. It is a fine bird. The capercallie cocks have played a long time, which is amusing to anyone to hear them.—Sunday, 28th. I waited on my birds. It is hard work on Sundays to keep the people from tormenting

my birds, and I do not like to be too hard on them.—Tuesday, 30th.—I was chiefly fishing; as to my birds I had them all settled in the coops; it put me out to find at night that the housekeeper wanted Mr. Lloyd to alter the birds again; but I asked his honour for what did he want to do so? is it not an old saying, 'let well alone?' which he agreed with. Any wild creatures the more seldom they are disturbed, the better for the birds or beasts; also for them that have them under their care. —Thursday, June 1st. I stopped at home attending to my birds; they were all well except one, which was either dead or killed; but it was very much torn by the rats. I went into the woods and got trees for them.—Tuesday, June 6th. Now this was rather a day of joy to me, after, it was a day of torment to me—now all was to be got ready to put the birds into the coops also; first one thing was to be done; all in a minute, it was to get boards and nail them on the boat, so that we could put the two sets of coops in it, with them facing each other, so that I could walk between them, to feed and water them on the river. On our way to Gottenburgh, as we were to be there on Thursday at the longest, any one may think what a day it was to me, how to get all this done by the close of night. Now came the grand points. It was to put the birds in order for their long journey, which I had to do by myself. I must say I had not time to think of any thing, but run from one place to the other; but in a word all was the same. Now, at ten o'clock, I got into the house to get those wild birds; they are chiefly hens; I got them all in safety into the coops; seven of the black game and two of the others into one coop, five cocks into another, four cocks into another, seven hens in another, also four cocks; in this manner we put them—seven hens in a coop by themselves; by this I think there are thirty-six birds under the six coops this night,—I may say a wet weary night to me—up to ten o'clock the night wet and cold. I got wet through; but that was little to be wondered at, as we had to carry the six coops full two hundred yards or more. I got a drop of coffee at one; then I took a big coat and a bunch of straw to the boat for my bed; but as ill-luck would have it to be, the rain came in in all parts where poor Larry was to take up his quarters; so by that I was forced to sit under the coops in the best manner I could, and I was as cold as ever I felt in my life;

but this was not all ; to add to my misery, the birds that I put in the coops were flapping against the coops to that degree, that I thought by the clear daylight I should have them all dead in the coops. I was waiting for daylight to appear.—Wednesday, 7th. As soon as I could take a look at them, it may be expected I did, to my surprise the coops of two of them were almost covered with feathers and blood. I then felt what I never thought of in my life, to see them in such a state ; so I took up my blinds off them, and gave them all plenty of boughs and corn ; I went up and got them up at the house ; I went to the bed-room of Mr. Lloyd, and informed him of the state of them on board ; by that he got up in a few minutes. All things were got in order for our voyage down the river, and we left the shore. The birds by this time were become settled, unless we went near them.—Thursday, June 8th. This day we arrived at Gottenburgh. We went to the boats, then to the schooner, which was to take me and my birds to Hull. We got the birds on board ; they seemed well pleased to get them, to bring the birds over to England with them, as they said it was the greatest thing that ever was heard of in this life, to see so many of the birds alive and looking well.—Saturday, 10th. This morning they run down to the castle ; then we got down to the mouth of the river ; the wind was so that we could not get out ; but at seven o'clock they weighed anchor and now I took my last sight of the Swedish shore.—Sunday, 11th. At twelve o'clock they were out in the main ocean fifty-four miles ; my birds were all right, they seemed to feed well.—Monday to Wednesday the birds were well.—Thursday I thought one was dying, but it recovered in a short time.—Friday and Saturday all well.—Sunday, 18th. This day the birds in one coop were very angry with each other ; but I put them by themselves—wild and tame will not do well in the same coop. This evening we came close under the Yorkshire coast ; we were in sight of the fields and houses.—Monday, 19th. We went on shore at Hull ; the birds feed well at present.—Wednesday, 21st. I got all my birds on the steamer quite safe ; they are all on the quarter-deck.—Thursday, 22d. This day was a fine one ; the birds were all well. Nothing happened worth notice on the passage.—Saturday, 24th. This morning I set out from Dundee with a cart and mule with four more, to the place where the birds

came ; they were all in the best of health ; I got them up to the inn, fed them, and put the coops all in a settled place, and then got all things ready for packing them into my small baskets that I had brought with me for the purpose from Sweden, and started off with a great many good wishes for our safe arrival. On my arrival at Taymouth Castle I put up my birds as well as I could for the night.—Sunday, 25th. I found the birds as well as I could expect ; they all fed well. I must say that there are some of the birds' heads stripped almost of their feathers striving to get out of the small places where they are cooped up.—Tuesday, 27th. The house intended for the birds being completed, I went and put them all in it ; the hens into one end, and the cocks into the other.—Wednesday, 28th. I went to see the birds ; the most of them were up at the top of the house, and had eaten of the trees that were there.—Monday, July 3d. To this time the birds were well. On this day I started by the mail-cart for Inverness, where I arrived (having stopped on the road) on the following Saturday.—Thursday, 13th. After an excursion to Sir G. Sinclair's I returned, and arrived this day once more at Perth ; set out for Dundee ; and on Saturday 15th, got on board the Forfarshire, from which I was put down at Sheringham in safety on Thursday the 20th."

Well done Larry ! and he landed actually at Sheringham.

VI

NOTES ON FROG-BIT (*Hydrocharis*) AND HAIR-WEED (*Potamogeton pectinatus.*)

By Robert Gurney.

1. Frog-bit. (*Hydrocharis morsus-ranae*).

Frog-bit is one of our commonest plants in marsh ditches and sheltered spots in the broads, and reproduces so freely by sending out stolons from which new young plants grow that it tends to clog a ditch with a tangled mass of vegetation. Its beautiful little three-petalled flowers are either male or female, but it is not known for certain whether each plant with all its ramifications produces only flowers of one sex. However that may be the flowers are of very little use as they very rarely set seed. Mrs. Arber says of it (1920 p. 46) "seed is hardly ever set in this country." In 1947 frog-bit was exceptionally abundant and flowered more freely than usual. In consequence, no doubt, of the remarkably fine sunny weather of that summer a large proportion of flowers set seed. As the flower fades and the seed ripens the flower stalk elongates and bends down under water, so that the seed heads can only be seen if the plant is lifted out of the water, and then they might easily be mistaken for the winter-buds or turions which are formed at the ends of the stolons. These seed-heads swell up and eventually burst, exuding their jelly-like contents in which are the seeds. These brown seeds are thickly covered with spines and soon sink to the bottom. I collected quite a lot of seed in September, and also a number of turions, but, while the turions all started into growth in April, none of the seeds germinated until late in the summer. As the seedlings at first remain on the bottom and are very inconspicuous I did not notice them until some rose to the surface and spread out their tiny leaves in August. The accompanying drawings will show the successive stages of growth, and I make no comment on the peculiar appearance of the seedling, since I am not very clear as to what the parts of it actually represent, and hope that some botanist will explain them later on. As they germinated so late the plants have made very little growth and have produced no stolons. On the other hand they have produced what appear to be turions

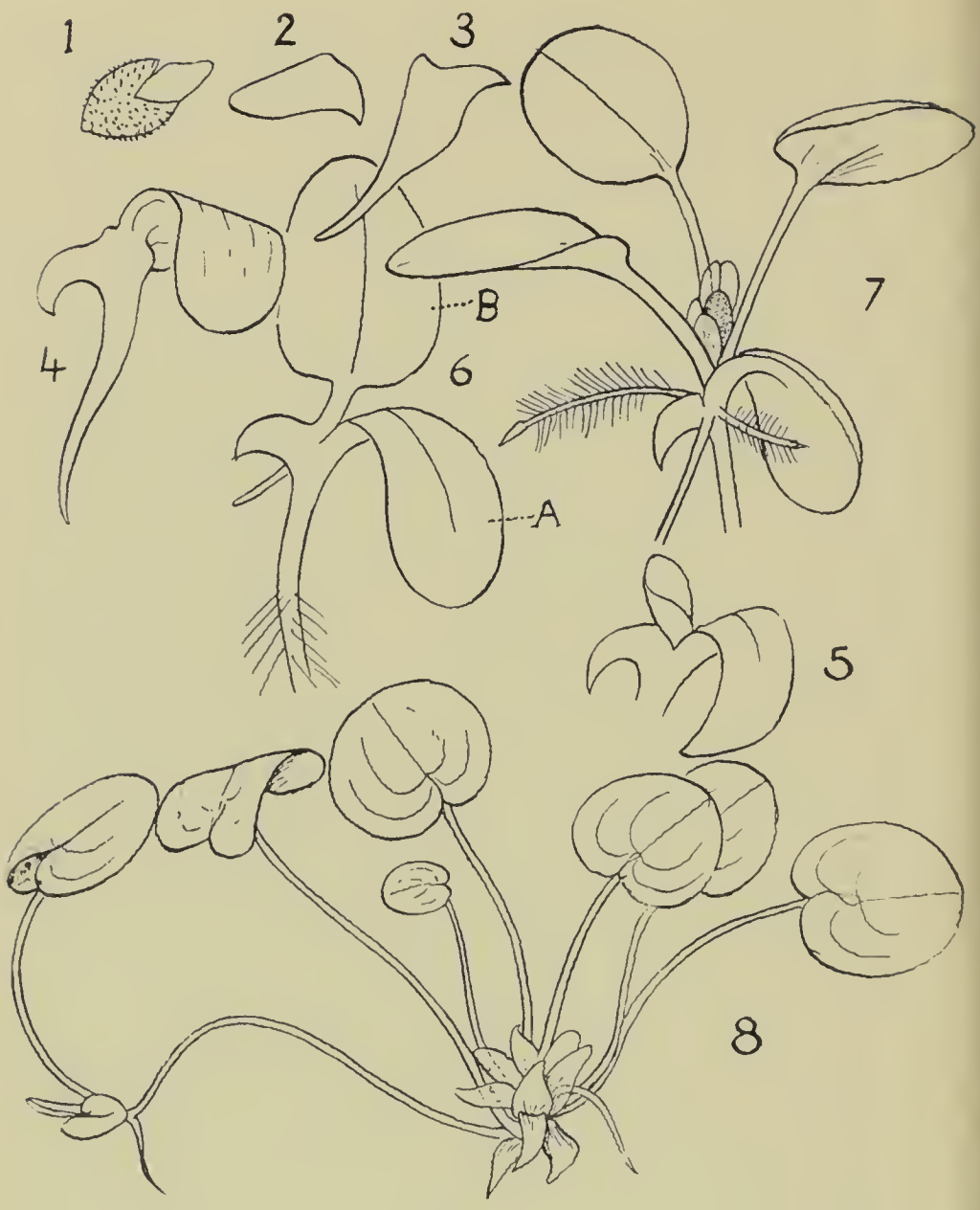

FIG. 1.

FROG-BIT (*Hydrocharis morsus-ranae*).

1–7 Seedlings, progressive stages from 1, seedling emerging from the spiny seed-coat. 4.—Seedling with first leaf. 5.—Second leaf appearing. 6.—Seedling with two leaves, A. first leaf., B. seeond leaf. 7.—Seedling with four leaves and minute resting bud or turion in the axis of the plant. The third and fourth leaves have eaeh a pair of stipules. (All figures enlarged.)

8.—Young plant grown from a resting bud and having formed its first stolon with a young plant at the end.

(Slightly redueed).

in the angle between the leaves, and I hope that these will survive the winter and produce new plants in the spring. I cannot find that any seed germinated naturally in Norfolk. In September this year I searched very carefully in a ditch at Calthorpe where seed was plentifully formed last year but found not one seedling. I collected a number of very small plants without stolons, but each one when carefully examined proved to be without doubt a plant derived from a turion. It would seem that the seed, as is the case with a number of water plants, does not normally germinate until the second year, and seedlings are to be expected therefore next spring. I have seeds of several species of Potamogeton collected in 1947, but none of these have germinated except two or three of *P. natans*. On the other hand seeds of Arrowhead (*Sagittaria*) have germinated very freely, and I find that those of *Alisma plantago*, or a fair proportion of them, germinate in the first year.

This year frog-bit has been very much less luxuriant than last year, and flowers were relatively few and set no seed.

2. *Potamogeton pectinatus*.

It is well-known that the fennel pondweed,* *P. pectinatus*, which is so abundant in the Hickling-Horsey region, forms remarkable resting buds or turions at the end of the white mud-stolons, from which new plants will grow in the spring. These turions (fig, 2.D) are formed by the storing up of starch in the last two nodes of the stolon, and are easily found if the plants are raked up by the roots at any time from the end of July until the plants die down in autumn. This year (1948) when examining plants in Calthorpe Broad I was struck by the presence among the leafy shoots of small pink shoots without leaves and slightly swollen at the ends. So far as could be seen with an ordinary lens these outgrowths seemed to be diminutive turions, and that impression was confirmed when they were examined later with higher magnification. Fig. 2 B shows the end of one such shoot, and fig 2 C shows an early stage of a turion at the end of a stolon in the mud, before it has swollen up with starch ; it is clear that the two structures are the same. The only difference is that " B " has a short root. Those that I brought home and kept alive started into growth and became new leaf-shoots, but also with downward-growing stolon-like branches

* Local name Hair-weed.

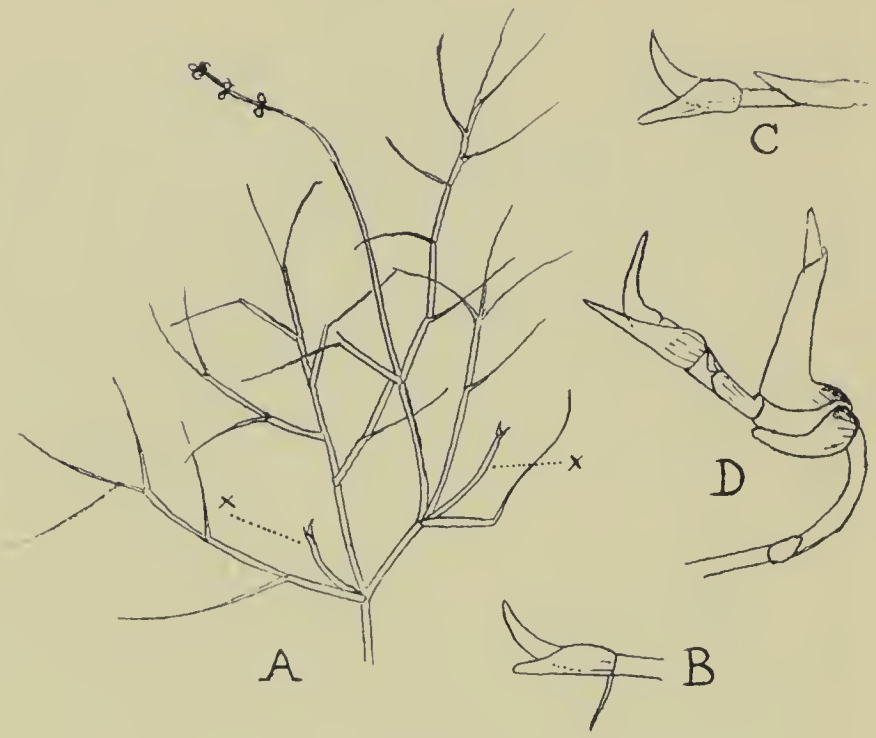

FIG. 2.

Potamogeton pectinatus.

A.—Part of a flowering plant of *Potamogeton pectinatus* showing two "false turions" at X.

B.—The end of one of these turions.

C.—Young turion from the end of a stolon.

D.—Mature turion.

(A. slightly reduced. B—D. enlarged.)

without leaves; I was unable to find out anything about them at Calthorpe as the weeds were all cut in August. No trace of these "false turions" could be found at Hickling in September.

Plants from Calthorpe were sent to Dr. G. Taylor of the British Museum (Natural History), who has made a special study of the Potamogetons, and he tells me that the formation of turions among the leaf shoots is not uncommon. In a paper on **P. succicus* he says "another and less accidental mode of increase and dispersal is by the formation of a succession of winter-buds or turions on the leafy shoots towards the end of the flowering season," but I have not found any other reference to these turions either in Fryer's monograph or in Mrs. Arber's book "Water Plants."

It seems to me that these "false turions" would repay further study. Are they really quite normal growths to be found every year, and do they under natural conditions actually store food material and function as winter buds? Or are they, as I think, abnormal growths which, starting to develop into turions, fail to achieve their purpose and eventually resume growth into normal leaf shoots? On the other hand the fact that those that have resumed growth in my aquaria have produced also stolon-like shoots seems to suggest that they are actually growing as normal turions would into independent plants, though still attached to the parent plant.

* *P. suecicus* is a hybrid between *P. pectinatus* and *P. filiformis*. Dandy and Taylor, 1946, Proc. Bot. Soc. Edinburgh, xxxiv. p. 348.

VII

FLORA AND FAUNA OF NORFOLK.

Miscellaneous Observations.

Compiled by E. A. Ellis.

Plant Notes from West Norfolk, 1948. I see with regret that East Winch Common has come under the plough. In *Trans. Norf. & Norw. Nat. Soc.* xvi, 18, I drew attention to the bog community here and pointed out that it was the only West Norfolk locality for *Gentiana pneumonanthe* and *Littorella uniflora*. The lower lying parts of the common will prove difficult to cultivate and it is possible that a small population of these plants will survive there. At North and South Wootton more of the reclaimed land has been ploughed, so that all except the 1933 enclosure is now arable out of the area reclaimed in recent years, together with about half of the ancient reclamations. Fresh land is also being taken in from the salt marsh. In ploughing, some of the old sea walls have been levelled and it was at first proposed to fill in the creek-like ditches, but this has not been done. Little difference has been made to the native plants, but the old ditches in the newly cultivated area of the ancient marsh have been invaded by a large yellow watercress (*Rorippa amphibia*). This plant has been long known in Norfolk and I have seen it recently at Gayton Thorpe and East Winch, but not during the last 23 years at Wootton, where it seems to be an introduction due directly or indirectly to the recent disturbances. It is an addition to the parish flora comparable to the musk (*Mimulus guttatus*) which arrived in 1941 and the cord grass (*Spartina townsendii*) which appeared in 1938; but it remains to be seen if it will persist as they have done. *Oenanthe lachenalii* has reappeared (see *Trans.* xvi, 106). The henbane (*Hyocyamus niger*) flourished this year at Pentney, by the side of the Lynn—Norwich road and attracted much attention. This species appears sporadically in West Norfolk and came to my notice at Roydon in 1938 and Wolferton in 1928, but never seems to establish itself permanently. In the neighbouring village of Bilney there has grown up a large colony of dwarf elder (*Sambucus ebulus*) In

the Wissey Valley, improvement in drainage has lowered the water level in the small patches of sedge that represent the former Beechamwell and Eastmoor fens and will, if maintained, complete their extinction. Caldecote and Oxborough fens, on the other hand, are not affected and retain their characteristic covering of *Cladium mariscus*, with its associated birds and plants. (C. P. Petch).

Abnormal Flowering of Bog Myrtle. The bog myrtle (*Myrica gale*) usually bears male and female flowers on separate bushes ; but very occasionally a plant is found producing both kinds. A group of bushes belonging to a single isolated clone occupying mature sallow carr on Middle Marsh, Wheatfen Broad, Surlingham, April 1948, was remarkable in that male and female catkins were to be found not only occupying different branches of the same bough, but sometimes growing together on the same twig, while in a few instances male and female flowers went to the making of a single catkin. The plant grew in a very wet place overshadowed in summer by tall sallows and other bushes. An examination of some hundreds of bog myrtles occupying sedge fen at Surlingham failed to reveal the presence of any further examples of monoecious flowering, but considerable variation in size and form of the male catkins was found to occur, by which it was possible to distinguish one group of bushes belonging to a common stock (clone) from another group.

(E. A. Ellis).

Great Bindweed with Five-lobed Corolla. A single large plant of *Calystegia sepium* with numerous branches spread over reeds, reed-grass, etc. on a marsh wall at Wheatfen in August, 1948, produced flowers which in every case exhibited a distinct separation of the corolla into five petal-like parts. The cleavage must have occurred at a very early stage in development, for it was found to have taken place in even the smallest of unopened flower buds. Accidental splitting of the trumpet-like corolla is of fairly frequent occurrence after the flowers have been buffeted by wind and rain, but the tearing is seldom continued to the base, whereas in the present instance the five " petals " showed no sign of having been joined at any point.

(E. A. Ellis).

Sea Campion Lacking Anthocyanin. In a colony of some hundreds of plants of sea campion on the landward shore of Norton Channel, opposite Scolt Head Island, two examples were found in which all traces of the usual purple anthocyanin pigment were lacking, June 1948.

(E. A. Ellis).

Hairy variety of the Black Nightshade. A plant of black nightshade, *Solanum nigrum*, growing as a weed of arable land at Claxton, July, 1948, was distinguished by the possession of humerous hairs on its leaves, giving the whole a woolly appearance.

(R. Sewell).

Smut in Capsules of Field Speedwell. *Veronica arvensis* growing on the dunes near Smuggler's Gap, Scolt Head, July 1948, was found to be freely attacked by the smut *Schroeteria delastrina* (Tul.) Wint. (see Trans. xvi, pp. 174—75).

(E. A. Ellis).

A Broadland Slug. In 1915 A. Luther (*Acta Soc. Fauna & Flora Fennica* xl, no., 2, p. 1) showed that the slug hitherto known as *Agriolimax agrestis* really comprises two species, namely true *A. agrestis* (L.) and *A. recticulatus* (Müller). The latter is the common Field Slug of our gardens, pastures and cultivated land, which is sometimes present in such numbers as to constitute a pest and is found abundantly all over the country. True *A. agrestis* was not authenticated from the British Isles until 1941, when Mr. Hugh Watson identified specimens sent to him from Wheatfen Broad as this species (*J. Conchol.*, xxi, p. 238). In 1948 Dr. H. E. Quick confirmed that examples collected in the Ant valley, at Sutton Staithe and Alderfen Broad, are true *A. agrestis*. So far this slug has not been recorded from any locality in the British Isles outside the Norfolk Broads district, where it lives in fen and reed-swamp and is probably generally distributed in suitable habitates. At Wheatfen and Sutton it occurs amongst *Glyceria maxima* and at Wheatfen and Alderfen in *Juncus subnodulosus* fen, where it exhibits a particular fondness for *Angelica sylvestris*. By day it rests concealed in the expanded leaf-bases of this plant, and Mr. E. A. Ellis, who has found it also at Surlingham Broad, has observed it in the evenings feeding in numbers on the umbels

of *Angelica* and *Peucedanum palustre*. True *A. agrestis* is smaller and more lively than *A. reticulatus* and paler than the typical form of that species, but as the critical distinction between the two lies in the genitalia, dissection of mature individuals, only obtainable in autumn, is essential for reliable diagnosis.

(A. E. Ellis.)

A Broadland Shore-hopper. Very large numbers of the amphipod *Orchestia bottae* Milne-Edwards were found living in tide refuse consisting mainly of broken reeds on the Half-moon Island in Rockland Broad, 25th July, 1948. Several of the females were seen to be carrying broods of pink-coloured young.

(E. A. Ellis).

Bush-cheep devouring a snail. A male bush-cheep, *Pholidoptera griseoaptera* (Degeer) was seen in the act of eating an amber snail, *Succinea putris* (L.) on a rond-marsh at Wheatfen Broad, 2nd September, 1948, in daylight.

(E. A. Ellis).

A fungus-eating beetle. On 7th December, 1948, ten scarlet, ladybird-like beetles, *Endomychus coccineus* (L.) were found eating the leathery "silver-leaf" fungus, *Stereum purpureum*, on a birch stump in Surlingham Wood. Their larvae were discovered consuming the same fungus subsequently.

(E. A. Ellis).

Chrysomelid beetles eating gipsywort. Numerous specimens of the beetle *Chrysolina polita* (L.) were found to be eating leaves of the gipsywort, *Lycopus europaeus* (L.) on a marsh at Wheatfen during the hours of darkness, 17th October, 1948, just prior to their hibernation.

(E. A. Ellis).

Winter caterpillars of Large White Butterfly. A few larvae of *Pieris brassicae* persisted out of doors on cabbages at Tharston until the third week in February, 1948, when the onset of frosty weather put an end to their activities.

(D. H. Smith).

LEPIDOPTERA. Several humming-bird hawk moths survived the winter of 1947-48 in Norfolk, as in many other English counties, and took wing in March; but very few of these insects occurred in the summer of 1948. Two Camberwell Beauty butterflies were seen early in the year; one in Norwich on 10th March by Mr. E. Scott, and the other at Waxham on 11th April by Mr. B. W. Youngs. Large tortoiseshells appeared in a number of Norfolk localities, including Wells, Cromer, Bacton, Dereham, Norwich, Surlingham and Ellingham; hundreds of their caterpillars were found clustering on grey sallows growing over the water at Wheatfen in early June. The year 1948 was notable for the widespread occurrence of caterpillars of the small eggar moth, *Eriogaster lanestris* (L.) on blackthorn and whitethorn. A dwarf specimen of the red admiral butterfly taken at Claxton on 3rd March (R. Sewell) had probably hibernated. Only a dozen colonies of the web-making caterpillars of the willow ermine, *Yponomeuta rorella* (Huebner) were seen on white willows beside the Yare at Surlingham, Brundall and Strumpshaw in June, 1948.

BRITISH MUSEUM
NATURAL HISTORY
PRESENTED
21 MAR 1952

LIST OF MEMBERS, DEC., 1948.

Members who have compounded for their Subscriptions are marked with an asterisk.

Elected

A

1947 Adcock Miss G. E., 118, St. Clement's Hill, Norwich
1939 Addison Rev. W. R. F., V.C., Coltishall Rectory, Norwich
1946 Adlam Miss P., 122, College Road, Norwich
1946 Ali Miss E. M. S., 60, Beaconsfield Road, Norwich
1947 Alimonda L. A., 28, Sunnyside Gardens, Upminster, Essex
1947 Allen Capt. Graham, Sheringham House, Holt, Norfolk
1936 Alston G., Lyngate House, Worstead, Norwich
1925 Anderson Dr. T., 386a, Unthank Road, Norwich
1947 Andrew E. S., 59, The Avenue, Lowestoft, Suffolk
1895 Andrews W. H. M., Drummond Lodge, Swansea, Dorset
1912 Astley Major D. G., The Cottage, Wroxham, Norwich

B

1919 Back H. W. (*Hon. Member*), Hethersett Hall, Norwich
1935 Back Mrs. H. W., Hethersett Hall, Norwich
1945 Backhouse Rev. T. P., The Rectory, Caistor St. Edmunds, Norwich
1933 Bacon Edmund, Raveningham Hall, Norfolk
1939 Bagnall-Oakeley A. P., 2, Acacia Close, Holt, Norfolk
1945 Bainbridge P., Orchard Hill, Coltishall, Norwich
1946 Bainbridge R. J., Gt. Plumstead, Norwich
1945 Banham Paul R., 25, Larkman Lane, Norwich
1939 *Barclay Col. P., M.C., Barclay's Bank, 54, Lombard Street, E.C.3
1948 Barker, Miss Janet, 'Shelfanger,' Christchurch Road, Norwich
1921 Barnard Miss G. V., M.B.E., The Castle Museum, Norwich
1948 Barnes Miss R. M., 171, Angel Road, Norwich
1948 Barr, S. H., 58, Mill Hill Road, Norwich
1937 Barrett John A., The Lodge, Cringleford, Norwich
1927 *Barrington F. J. F., 52, Harley Street, W.1.
1937 Barry Miss E., 'Benskins,' Westfield, Battle, Sussex
1945 Begbie D., Apple Acre, Barford, Norwich
1945 Begbie Mrs. D., Apple Acre, Barford, Norwich
1947 Benn Miss N., The Castle Museum, Norwich
1934 *Bennett W. W., Swanton Morley, East Dereham, Norfolk
1921 Berney F. L., c/o Archer Bros., Gracemere, Rockhampton, Queensland, Australia
1921 Bignold Sir C. R., Loddon House, Loddon, Norfolk
1947 Birkbeck H., Westacre Abbey, King's Lynn, Norfolk
1901 Birkbeck H. A., Westacre, King's Lynn, Norfolk
1921 Birkbeck Col. Oliver, Little Massingham House, King's Lynn
1947 Bitton E. Q., F.Z.S., Church Farm, Runhall, Norwich
1933 Blackburne C. I., Weydown Hatch, Haslemere, Surrey
1930 Blake Mrs., The Red House, Bradeston, Brundall, Norwich
1925 Blofeld T. C., Hoveton House, Norwich
1885 Boardman E. T., How Hill, Ludham, Norfolk
1939 Boardman H. C., Ranworth Hall, Norwich
1938 Boardman M. R., How Hill, Ludham, Norfolk
1936 Bolingbroke Miss C., Ferryside, Riverside Road, Norwich
1924 Boyd A. W., Frandley House, Northwich, Cheshire
1915 Bradfer-Laurence H. L., F.S.A., Sharrow End, Ripon, Yorks.

Elected

1947 Bradshaw Anthony, 11, Ornan Road, Hampstead, N.W.3
1946 Brereton J., Brampton Hall Farm, Norfolk
1938 British Empire Naturalists' Association, White House, Saham Toney, Thetford, Norfolk
1946 Brooks Basil, Burghsted Lodge, Billericay, Essex
1912 Brooks J. R., North Walsham Wood, Norwich
1925 Brooks Mrs. J. R., North Walsham Wood, Norwich
1939 Brotherton Miss H. J., Burnage House, Martello Park, Canford Cliffs, Bournemouth
1941 Brown C. Clifton, Congham Lodge, Hillington, King's Lynn Norfolk
1921 Bruton M. S., Norfolk House, Aylsham, Norfolk
1925 Bryan H., ' Lanthwaite,' Eaton, Norwich
1947 Bryan Mrs. H., ' Lanthwaite,' Eaton, Norwich
1939 Buckingham Mrs. Brian, Aylsham, Norfolk
1944 *Buckton Dr. P. T., Wymondham, Norfolk
1948 Buddell J. L., Halewood, Beeston Estate, West Runton, Norfolk
1926 Bullard E. J., Hellesdon House, Norwich
1925 Bulwer Mrs., Heydon, Norwich
1944 *Buncombe Dr. G. H., The Grove, Pier Plain, Gorleston, Great Yarmouth
1923 Burton Arthur, M.D., ' Stenson,' Cromer, Norfolk
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1936 Burton Miss F. W., Harford Manor, Ipswich Road, Norwich
1928 Bushell M. D., Bolwick, Marsham, Norwich
1947 Buttery Miss E. M., B.Sc., The Training College, Norwich
1921 *Buxton Major A., D.S.O., Horsey Hall, Great Yarmouth
1884 Buxton A. F., Fairhill, Tonbridge, Kent
1947 Buxton Hugh, ' Cowans,' Thetford, Norfolk
1939 Buxton H. F., Easneye, Ware, Middlesex
1923 *Buxton Major Ivor, Stanstead Lodge, Stanstead Abbots, Herts.
1946 Buxton John, Horsey Hall, Great Yarmouth
1906 Buxton R. G., Wiveton Hall, Holt, Norfolk
1906 Buxton W. L., Bolwick Hall, Marsham, Norwich

C

1932 Caffyn D. E., 3, Evesham Road, Reigate, Surrey.
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1945 Chenevix-Trench G. C., ' Rocklands,' Weybourne, Holt, Norfolk
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1924 Chittock Mrs. A. T., 12, Chapel Field North, Norwich
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1948 Cock J. H., Abbey Farm, Guestwick, Dereham, Norfolk
1945 Coke Col. R. E., ' Oaklands,' North Street, Sheringham, Norfolk
1945 Coke Mrs. R. E., ' Oaklands,' North Street, Sheringham, Norfolk
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1921 Cozens-Hardy A., Oak Lodge, Sprowston, Norwich
1935 Cozens-Hardy Miss, Oak Lodge, Sprowston, Norwich
1945 Cozens-Hardy B., Glavenside, Letheringsett, Holt, Norfolk
1945 Curtis G. J., The Laurels, Brundall, Norwich

D

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1928 Daniels E. T., 334, Dereham Road, Norwich
1939 Dashwood Major H. R., Caldecott Hall, Fritton, Great Yarmouth
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1947 de Hamel Mrs., White House, Trimingham, Norfolk
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1947 Doar Rev. F. W., 410, Unthank Road, Norwich
1938 Duff Miss, The Training College, Norwich
1948 Dunbar Capt. R. E. C., R.N., 'Inca,' Oulton Broad, Suffolk

E

1911 Easter W. C., 99, City Road, Norwich
1946 Edwards Miss N. F., 106, Priory Road, West Hampstead, N.W.6
1939 Ellis A. E., M.A., F.L.S., Epsom College, Epsom, Surrey
1929 Ellis E. A., F.L.S., Wheatfen Broad, Surlingham, Norwich
1938 Ellis Mrs. E. A., Wheatfen Broad, Surlingham, Norwich
1936 Ellis M. B., B.Sc., Commonwealth Mycological Institute, Ferry Lane, Kew, Surrey
1946 Euren Miss, 20, Recreation Road, Norwich
1946 Euren Miss, M.D., 20, Grange Road, Norwich
1919 Evans-Lombe Major E., Marlingford Hall, Norwich
1932 Evans-Lombe Mrs. E., Marlingford Hall, Norwich
1948 Evans-Lombe Capt. E. M., Queen Cottage, Bledlow, Aylesbury, Bucks.

F

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1927 Fawkes Dr. R. B., Rede's House, Cromer, Norfolk
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1936 Finch C. H., Costessey House, Norwich
1946 Fisher James, The Old Rectory, Ashton, Northampton
1946 Fletcher H. N., Bracon Lodge, Braconash, Norwich
1945 Forsythe J. A., Heathfield House, Brundall, Norwich
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1947 Fowler Eric, Norfolk News Co., Ltd., 57, London Street, Norwich
1946 Fraser Miss Margaret, 224, Unthank Road, Norwich
1922 Frere Sir Bartle, Mangreen Hall, Norwich

G

1927 Garnett R. M., Chapel House, Whitby Gate, Thornton-le-dale, Pickering, Yorks.
1927 Gay Miss C. E., Little Toft, Stoke Holy Cross, Norwich
1926 Gayner J. S., Hall Cottage, New Earswick, York
1928 George S. S., White House, Saham Toney, Thetford, Norfolk
1947 Gibson Colin, Key's Hill, Wroxham, Norwich
1947 Gibson Mrs. Colin, Key's Hill, Wroxham, Norwich
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1944 Goff M. G., 299, Aylsham Road, Norwich
1939 Goodchild H., 215, Unthank Road, Norwich
1939 Goodchild Mrs. H., 215, Unthank Road, Norwich
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1901 Goose A. W., 185, Earlham Road, Norwich
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1945 Gould D. A. P., 8, Upper King Street, Norwich
1937 Gould R. P., Lime Tree House, Lime Tree Road, Norwich
1946 Gowing Cecil, Rackheath, Norwich
1919 Greatorex H. A., Witton, Norwich
1915 Great Yarmouth Free Library
1918 Gresham's School, Holt, Norfolk
1945 Griffiths T., 15, Essex Street, Norwich
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1929 Gurney John, Walsingham Abbey, Norfolk
1901 Gurney Q. E., Bawdeswell Hall, Norfolk
1894 *Gurney Robert, M.A., D.Sc., F.L.S. (*Hon. Member*), Bayworth Corner, Boar's Hill, Oxford

H

1892 *Haigh C. H. Caton, Grainsby Hall, Gt. Grimsby, Lincs.
1946 Hamilton Capt. A. H. B., 5, Oak Lodge, Thorpe Road, Norwich
1946 Hamilton Mrs. A. H. B., 5, Oak Lodge, Thorpe Road, Norwich
1926 Hammond C. R. A., Sprowston Grange, Norwich
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1947 Harrison J. C., Haynford, Norwich
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1945 Hinde Robert, 31, Mount Pleasant, Norwich
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1919 Howard H. J., F.L.S. (*Hon. Member*), 6, College Road, Norwich
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1931 Hulse Mrs. M. W., Park House, Bromham, Beds.
1946 Hutchings G. E., Juniper Hall, Mickleham, Surrey

I

1946 Ives Robert, ' By-way,' Cromwell Road, Cromer, Norfolk

J

1941 Jackson J. K., Assistant Conservator of Forests, Dept., of Forestry, Khartoum, Sudan
1937 Jarrold H. J., 415, Unthank Road, Norwich
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K,

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L

1948 Lake J. W. A., ' Three Oaks,' Horning, Norwich
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1946 Lloyd Major J. D., Warren Cottage, Euston, Thetford
1922 Lloyd Capt. L. W., Taverham Mill, Norwich
1948 Lloyd Mrs. L. W., Taverham Mill, Norwich
1945 Lockett Col. V., Crown Point, Norwich
1923 Long G. S. B., 18, The Crescent, Chapel Field Road, Norwich
1907 Long Mrs. G. V., Cecil Lodge, Cromwell Avenue, Woodhall Spa, Lincs.
1933 *Low G. Carmichael, M.D., 7, Kent House, Kensington Court, W.8.
1939 Lowth Miss, Little Toft, Stoke Holy Cross, Norwich
1946 Lyon Kenneth C. B., C.B.E., The Old Barn, West Runton, Norfolk

M

1924 MacKenzie Miss G., The Cottage, Ingworth, Norwich
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1934 Mahood Dr. A. E., ' Sunny Haven,' Haynford, Norwich
1931 Maidment Dr. F. N. H., Harleston, Norfolk
1937 Maingay Mrs., The Mount, Aylsham, Norfolk
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1947 Manning S. A., 4, Patteson Road, Norwich
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1945 Mc Lean A. S., ' Humbletoft,' East Dereham, Norfolk
1933 Mc Lean Colin, ' Humbletoft,' East Dereham, Norfolk
1945 Mc Lean D. C. H., ' Humbletoft,' East Dereham, Norfolk
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1922 Meicklejohn Mrs. R., ' Arcady,' Cley, Holt, Norfolk
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1946 Mills Miss Jean, 129, George Borrow Road, Norwich
1946 Mills J. Weston, 129, George Borrow Road, Norwich
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1948 Moore R. A., 127, Cecil Road, Norwich
1946 *Morgan Dr. G. W., The Green, Brancaster Staithe, King's Lynn
1944 Morris G. E., Pike House, Gong Hill, Farnham, Surrey
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N

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1925 Neville Sir R. J. N., Sloley Hall, Norfolk
1915 Nightingale S. R., Scratby Nall, Great Yarmouth
1939 Noble Miss E., White House, Saham Toney, Thetford, Norfolk
1926 Norfolk and Norwich Library, Guildhall Hill, Norwich
1915 Norwich Public Library

O

1948 Oldfield C. C., 16, Albany Road, Southtown, Gt. Yarmouth
1914 Oliver Dr. F. W., F.R.S. (*Hon. Member*), Dar el Nabati, Burg El Arab, Mariut, Egypt

P

1948 Palmer B. L., 'Rosslyn,' Briston, Melton Constable, Norfolk
1946 Palmer Miss D. G., 20, Grange Road, Norwich
1919 *Palmer Mrs. P. Hurry, Red Roots, North Drive, Great Yarmouth
1945 Pardoe Major J. P., 'St. Helena,' Dunwich, Suffolk
1939 Partridge P. W., Cherry Wood, Straight Road, Lexden, Colchester, Essex
1944 Paston-Green J., 2, Cannon Place, Hampstead, N.W. 3
1932 Patteson Miss, Gt. Hautbois House, Norfolk
1945 Paulson C. W. G., C/o Monotype Corporation Ltd., Salfords, Redhill, Surrey
1911 *Payler Donald, The Museum, Birmingham
1946 Payne Rev. H. J., Gt. Melton, Norfolk
1946 Payne Mrs. H. J., Gt. Melton, Norfolk
1945 Pennethorne Miss, 135, Newmarket Road, Norwich
1926 Percy Lord William, Horstead Hall, Norwich
1946 Pfob Mrs. L. M., Hill House, Little Melton, Norwich
1926 Phillippo G., Winnowsty House, Winnowsty Lane, Lincoln
1930 Podmore R. E., Maynards, Matfield, Kent
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1931 Pratt Alfred, The Cottage, Cliff Avenue, Cromer, Norfolk
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1948 Prosser S. T., 44, Aerodrome Crescent, Thorpe, Norwich
1948 Prosser Mrs. S. T., 44, Aerodrome Crescent, Thorpe, Norwich
1913 Purdy T. W., Woodgate, Aylsham, Norfolk

R

1929 Ramage H. P., Gresham's School, Holt, Norfolk
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1928 Raywood W., Honingham Thorpe, Norwich
1945 Renshaw Sir Stephen, Gt. Fransham, East Dereham, Norfolk
1946 Ribbons B. W., 28, Boundary Road, Norwich
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S

1948 Sainty J. E., B.Sc., The Hedges, West Runton, Norfolk
1931 *Salisbury Sir Edward, F.L.S., F.R.S., Director, Royal Botanic Gardens, Kew, Surrey
1939 Sapsworth A. D., c/o Barclay's Bank, St. John's Wood, London N.W.
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1937 Sawbridge Rear Admiral, Thrigby Hall, Great Yarmouth
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1943 Seago M. J., 37, West Road, Caister, Great Yarmouth
1936 Searle G. O., B.Sc., Flitcham Abbey, King's Lynn
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1923 Srurrell Miss P., The Manor House, Newton St. Faiths, Norwich
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1946 Stuart Alan, Red House, Stoke Holy Cross, Norwich
1922 Sumpter Dr. B. G., Brancaster Staithe, King's Lynn
1896 Sutton W. Lincolne, F.I.C., Framingham Pigot, Norwich
1938 Swann E. L., 282, Wootton Road, King's Lynn

T

1935 Taylor G. B., 7, Candover Close, Harmondsworth, West Drayton, Middlesex
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1943 Taylor Mrs. Mark, Arthingworth Rectory, Market Harborough Northants
1938 Taylor R. Sunderland, Culpho End, Nr. Ipswich, Suffolk
1938 Taylor Mrs. R. S., M.B.E., Culpho End, Nr. Ipswich, Suffolk
1945 Templewood The Rt. Hon. the Viscount, Templewood House, Cromer, Norfolk
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1946 Thouless Miss M. H., Apple Acre, Mill Road, Hethersett, Norwich
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1925 Tucker B. W., 9, Marston Ferry Road, Oxford
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1939 Turner Percy Moore, Oxnead, Marsham's Way, Gerrard's Cross, Bucks.
1947 Tusting Miss J. M., Home Close, Cringleford, Norwich
1946 Tydeman Miss M., Coddenham, Ipswich, Suffolk

U

1923 Upcher Rev. E. C. S., Sheringham House, Holt, Norfolk
1921 Upcher Sir Henry, Sheringham Hall, Norfolk
1943 Upcher Lady, Sheringham Hall, Norfolk
1945 Uridge H., 104, Hayes Way, Park Langley, Beckenham, Kent
1945 Uridge Mrs. H., 104, Hayes Way, Park Langley, Beckenham, Kent

V

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1939 van Poortvliet Mrs., The Beeches, Stratton Strawless, Norwich

W

1936 Wade Miss O. M., Elmsley Cottage, Yoxford, Saxmundham, Suffolk
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1947 Watt Mrs. K. R., Burnley Hall, Somerton, Great Yarmouth
1932 Wayne Mrs. E., Whissonsett Hall, Dereham, Norfolk
1946 Weston Miss F. M., 1, Muriel Road, Norwich
1945 Wharton Miss B. M., Wood Farm, Spixworth, Norwich
1932 Wheeler Eng. Capt. S. G., R.N., The Pheasantries, Edingthorpe, North Walsham, Norfolk
1937 Whitehead Dr. F. E., C.B.E., 112, Victoria Road, Oulton Broad, Suffolk
1947 Whittaker Dr. E. M., 64, Bethel Street, Norwich
1936 Whittaker S., 333, Norman Road, Derby
1948 Whittle J., 12, Brian Avenue, Norwich
1947 Wiles Miss Wenda P., Brook House, Stratton Strawless, Norwich
1945 *Wilson Capt. C. B., Irstead Lodge, Neatishead, Norfolk
1944 *Wiltshire E. P., British Consulate, Cairo
1947 Winsworth John, 64, Cardiff Road, Norwich
1948 Winter J. W., Thorpe Cottage, Hemingford Gray, Hunts.
1946 Wiseman Miss H., 135, Newmarket Road, Norwich
1948 Woolving Miss I. D., 118, Cecil Road, Norwich
1922 Wortley Francis, ' Half-year,' West Runton, Norfolk
1947 Wright F. J., 10, Bush Road, Upper Hellesdon, Norwich

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Candidates for ordinary membership may be nominated and elected at any meeting of the Society ; three dissentient votes shall exclude a candidate.

The annual subscription is ten shillings, payable on election or at the beginning of each financial year (April 1st) to the Hon. Treasurer, D. A. P. Gould, 8, Upper King Street, Norwich, who will supply a banker's order form for this purpose on request. Members may instead pay a life composition fee of £8.

Every member is entitled to receive one copy of the *Transactions* as published annually ; to attend the meetings and excursions and to make use of the Society's library. Members may bring friends to meetings.

Enquiries should be addressed to the Hon. Secretary, E. A. Ellis, Castle Museum, Norwich, to whom also applications should be made for back numbers of the *Transactions*.

MATERIAL FOR PUBLICATION.

The Hon. Editor will be glad to consider papers, preferably on Norfolk natural history, for the *Transactions*. These should aim at clarity of expression and should be typewritten. Such contributions should reach the editor by the end of September. The cost of a reasonable number of illustrations will be borne by the Society, but where great expense is likely to be incurred it is hoped that authors will endeavour to share the cost, by obtaining grants or otherwise. Authors receive 25 off-prints of their papers free and further copies may be ordered in advance either through the Hon. Secretary or the Soman-Wherry Press Ltd., Heigham Street, Norwich, from whom an estimate of the cost can be obtained.

CHANGE OF ADDRESS.

Prompt notification of members' changes of address will greatly facilitate the work of the officers of the Society.

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